

MINUTES OF PROCEEDINGS
OF THE
ROYAL SOCIETY OF CANADA
1954



PROCÈS-VERBAUX
DE LA
SOCIÉTÉ ROYALE DU CANADA
1954

OTTAWA
THE ROYAL SOCIETY OF CANADA

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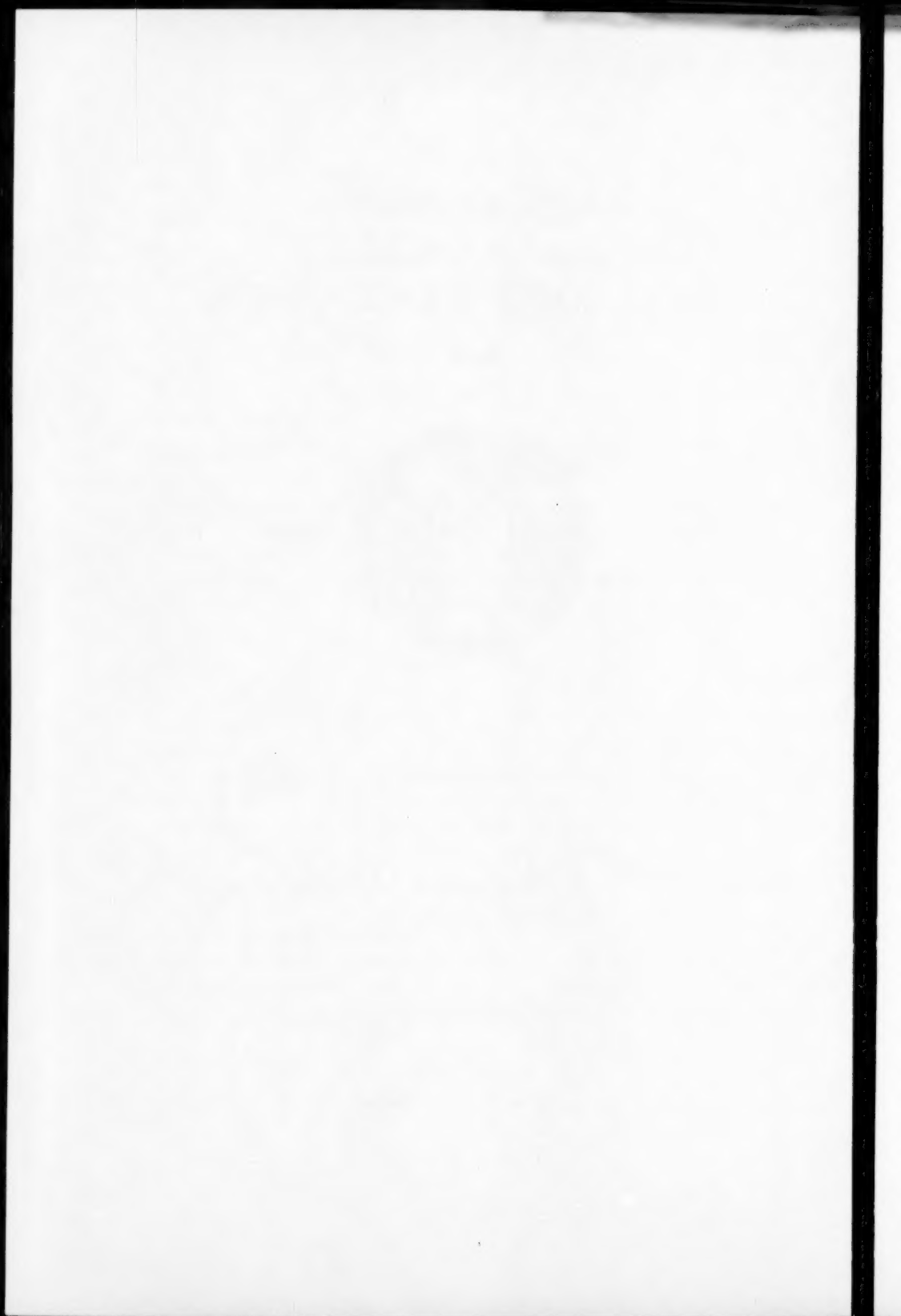
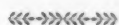


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1942—KLINCK, LEONARD S., M.S.A., D.Sc., LL.D., 2627 Marine Drive, West Vancouver, B.C.
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1937—MORGAN, A. E., M.A., LL.D., The Athenaeum, Pall Mall, London, S.W.1, England.
1952—VANDRY, Mgr F., C.M.G., P.A., Ph.D., Recteur de l'Université Laval, Québec, Qué.

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1953—DÉSY, JEAN, LL.D., Dr. Jur., C.R., Ambassade du Canada, Paris, France.

- 1954—FALARDEAU, JEAN-CHARLES, M.A., L.Ph., Université Laval, Québec, Qué.
 1942—FRÉMONT, DONATIE, Ch. Légion d'honneur, 1628, avenue Leclair, Verdun, Qué.
 1948—GARNEAU, RENÉ, Ambassade du Canada, Paris, France.
 1942—GAUVREAU, JEAN-MARIE, D.Sc.Pol., 1097 rue Berri, Montréal, Qué.
 1939—GOVIN, L'hon. LÉON-MERCIER, LL.L., LL.D., C.R., Off. d'Inst. publique, 511, Place d'Armes, Montréal, Qué.
 1952—GUÉNETTE, RENÉ, Commission des Ecoles Catholiques, 117 ouest, rue Ste. Catherine, Montréal, Qué.
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 1926—LANCTÔT, GUSTAVE, D. ès L., LL.M., LL.D., D.Sc.Pol., C.R., 154, avenue Daly, Ottawa, Ont. (Ex-président.)
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 1943—MELANÇON, CLAUDE, Chef des Services français, Chemin de fer National du Canada, Montréal, Qué.
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 1943—MORISSET, GÉRARD, B.A., LL.L., Hôtel du Gouvernement, Québec, Qué.
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 1951—ROBIDOUX, LOUIS-PHILIPPE, *La Tribune*, Sherbrooke, Qué.
 1948—ROY, ANTOINE, D. ès L., Archiviste de la Province, Québec, Qué.
 1926—SAINT-PIERRE, ARTHUR, D.Sc.Pol., Université de Montréal, Montréal, Qué.
 1940—SIMARD, Le R. P. GEORGES, O.M.I., Ph.D., D.Th., Université d'Ottawa, Ottawa, Ont.
 1951—SYLVESTRE, GUY, M.A., L.Ph., 355, rue Wilbrod, Ottawa, Ont.
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 1948—DENOMY, ALEX. J., M.A., Ph.D., LL.D., The Pontifical Institute of Mediaeval Studies, 59 Queen's Park Crescent, Toronto, Ont.
 1935—DORLAND, ARTHUR G., M.A., Ph.D., University of Western Ontario, London, Ont.
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- 1954—MACGREGOR, DONALD, C., M.A., Ph.D., University of Toronto, Toronto, Ont.
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- 1942—MICHELL, HUMFREY, M.A., Lennoxville, Que.
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- 1953—PRIESTLEY, F. E. L., M.A., Ph.D., University of Toronto, Toronto, Ont.
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- 1950—ARMSTRONG, J. E., M.A.Sc., Ph.D., Dept. of Mines and Technical Survey, Vancouver, B.C.
- 1950—AUGER, P. E., B.Sc., D.Sc., Laval University, Quebec, Que.
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- 1951—BERRY, LEONARD G., M.A., Ph.D., Queen's University, Kingston, Ont.

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1947—HENDERSON, J. F., B.Sc., Ph.D., Geological Survey, Ottawa, Ont.
1929—HUME, GEORGE SHERWOOD, O.B.E., Ph.D., Geological Survey, Ottawa, Ont.
1940—HURST, M. E., M.A., Ph.D., Department of Mines, Toronto, Ont.
1954—JAMES, W. F., M.Sc., Ph.D., D.Sc., Suite 1505, 320 Bay Street, Toronto, Ont.
1919—JOHNSTON, R. A. A., B.A., 112 Old Forest Hill Road, Toronto, Ont.
1943—JOLLIFFE, A. W., M.A., Ph.D., Queen's University, Kingston, Ont. (Life member.)
1941—JONES, I. W., B.Sc., Ph.D., Bureau of Mines, Quebec, Que.
1948—KINDLE, EDWARD D., M.A., Ph.D., Geological Survey, Ottawa, Ont.
1920—KNIGHT, C. W., B.Sc., R.R. 3, 1545 Glenburnie Road, Port Credit, Ont.
1951—LANG, ARTHUR H., M.A., Ph.D., Geological Survey of Canada, Ottawa, Ont.
1940—LANGFORD, GEORGE B., B.A.Sc., Ph.D., University of Toronto, Toronto, Ont.
1949—LAVERDIÈRE, L'abbé J. W., L. Sc., D.Sc., Laval University, Quebec, Que.
1949—LORD, C. S., B.A.Sc., M.A.Sc., Ph.D., Geological Survey, Ottawa, Ont.
1928—MACKEY, B. R., B.Sc., Ph.D., Geological Survey, Ottawa, Ont.
1952—MACKENZIE, G. S., B.Sc., M.A., Ph.D., University of New Brunswick, Fredericton, N.B.
1933—MAWDSLEY, JAMES BUCKLAND, B.Sc., Ph.D., University of Saskatchewan, Saskatoon, Sask.
1947—MCGERRIGLE, H. W., Ph.D., Bureau of Mines, Quebec, Que.
1927—MCLEARN, F. H., B.E., Ph.D., Geological Survey, Ottawa, Ont.
1924—MOORE, ELWOOD S., M.A., Ph.D., University of Toronto, Toronto, Ont. (Ex-President.)
1937—NORMAN, G. W. H., B.A.Sc., Ph.D., Newmont Mining Corporation, Box 658, Montrose, Colorado, U.S.A.

- 1945—OKULITCH, VLADIMIR J., M.A.Sc., Ph.D., University of British Columbia, Vancouver, B.C.
- 1925—O'NEILL, J. J., M.Sc., Ph.D., 3246 The Boulevard, Westmount, Que. (Ex-President.)
- 1937—OSBORNE, FRELEIGH F., M.A.Sc., Ph.D., Laval University, Quebec, Que.
- 1941—PARSONS, A. L., B.A., 360 Fairlawn Ave., Toronto, Ont.
- 1927—POITEVIN, EUGÈNE, B.A.Sc., D.Sc., Geological Survey, Ottawa, Ont.
- 1946—RICE, H. M. A., M.A.Sc., Ph.D., Geological Survey, Ottawa, Ont.
- 1936—RICKABY, H. C., M.A., Deputy Minister of Mines, Toronto, Ont.
- 1954—ROBINSON, S. C., M.A.Sc., Ph.D., Geological Survey of Canada, Ottawa, Ont.
- 1954—ROLIFF, W. A., B.Sc., Imperial Oil Limited, 56 Church St., Toronto, Ont.
- 1927—ROSE, BRUCE, B.Sc., Ph.D., Queen's University, Kingston, Ont.
- 1936—RUSSELL, L. S., B.Sc., M.A., Ph.D., National Museum of Canada, Ottawa, Ont.
- 1954—SATTERLY, JACK, M.A., Ph.D., Ontario Department of Mines, Toronto, Ont.
- 1938—SLIPPER, STANLEY EADES, B.Sc., 2013-8th St., S.W., Calgary, Alta.
- 1949—STERNBERG, C. M., National Museum of Canada, Ottawa, Ont.
- 1949—STEVENSON, J. S., B.A.Sc., Ph.D., McGill University, Montreal, Que.
- 1936—STOCKWELL, C. H., B.A.Sc., Ph.D., Victoria Museum, Ottawa, Ont.
- 1939—SWANSON, C. O., M.A.Sc., Ph.D., Consolidated Mining and Smelting Co., Ltd., Trail, B.C.
- 1927—TANTON, THOMAS L., M.A., Ph.D., Geological Survey, Ottawa, Ont.
- 1945—THOMSON, J. E., M.A., Ph.D., Department of Mines, Toronto, Ont.
- 1910—TYRRELL, JOSEPH B., M.A., B.Sc., LL.D., Room 1821, 44 King St. West, Toronto, Ont. (Life member.)
- 1937—WALKER, JOHN F., B.A.Sc., Ph.D., Deputy Minister of Mines, Victoria, B.C.
- 1921—WALLACE, R. C., C.M.G., M.A., Ph.D., D.Sc., LL.D., D.C.L., 4 Centre St., Kingston, Ont. (Ex-President.)
- 1945—WARREN, HARRY V., B.A.Sc., D.Phil., University of British Columbia, Vancouver, B.C.
- 1931—WARREN, P. S., Ph.D., A.R.C.S., University of Alberta, Edmonton, Alta.
- 1953—WATSON, J. W., M.A., Ph.D., Geographical Branch, Department of Mines and Technical Surveys, Ottawa, Ont.
- 1953—WEEKS, L. J., B.Sc., M.A., Ph.D., Geological Survey of Canada, Ottawa, Ont.
- 1939—WICKENDEN, R. T. D., Ph.B., M.A., Ph.D., 406 Customs Bldg., Calgary, Alta.
- 1926—WILLIAMS, M. Y., B.Sc., Ph.D., University of British Columbia, Vancouver, B.C.
- 1938—WILSON, ALICE EVELYN, M.B.E., Ph.D., Geological Survey, Ottawa, Ont.
- 1948—WILSON, J. TUZO, O.B.E., M.A., Ph.D., University of Toronto, Toronto, Ont.
- 1924—WILSON, MORLEY EVANS, Ph.D., Geological Survey, Ottawa, Ont.
- 1932—WRIGHT, J. F., Ph.D., 121 Southern Drive, Ottawa, Ont.
- 1932—WRIGHT, W. J., B.Sc., M.A., Ph.D., 117 Church St., Fredericton, N.B.

SECTION V.—BIOLOGICAL SCIENCES

Retired Members

- 1919—CAMERON, JOHN, M.D., D.Sc.
- 1946—CRAIGIE, JAMES, O.B.E., M.B., Ph.D., D.P.H., F.R.S., Imperial Cancer Research Fund, Burtonhole Lane, The Ridgeway, Mill Hill, N.W. 7, London, England.
- 1936—DEARNESS, JOHN, M.A., LL.D., 30 Marley Place, London, Ont.
- 1941—DEGRYSE, J. J., Ph.D., Department of Agriculture, Ottawa, Ont.
- 1912—FAULL, J. H., Ph.D., Jamaica Plains, Mass., U.S.A.
- 1922—GIBSON, ARTHUR, LL.D., F.E.S., F.E.S.A., 30 Cooper St., Ottawa, Ont.
- 1916—HUNTER, ANDREW, C.B.E., M.A., B.Sc., M.B., Ch.B., F.R.S.E., University of Toronto, Toronto, Ont.
- 1943—KIRK, L. E., M.S.A., Ph.D., Agricultural Organization of U.N., Rome, Italy.
- 1911—LEATHES, JOHN B., B.Ch., Sheffield, England.

- 1918—LEWIS, FRANCIS J., D.Sc., F.R.S.E., F.L.S., University of Alberta, Edmonton, Alta.
 1909—MACBRIDE, ERNEST W., M.A., F.R.S., London, England.
 1932—MACALLUM, A. BRUCE, M.B., M.D., Ph.D., University of Western Ontario, London, Ont.
 1937—MARRIAN, GUY F., D.Sc., F.R.I.C., F.R.S., Department of Medical Chemistry, University of Edinburgh, Edinburgh, Scotland.
 1937—McDUNNOUGH, J. H., M.A., Ph.D., Department of Agriculture, Ottawa, Ont.
 1922—MILLER, JAMES, M.D., D.Sc., F.R.C.P.E., F.R.C.P.(C), Westend House, Witney, Oxfordshire, England.
 1922—MILLER, F. R., M.A., M.B., M.D., F.R.C.P.(C), F.R.S., University of Western Ontario, London, Ont.
 1930—NEWTON, ROBERT, M.C., B.S.A., M.Sc., Ph.D., Box 147, White Rock Hilltop, B.C.
 1922—O'DONOGHUE, CHAS. H., D.Sc., F.Z.S., University of Reading, Reading, England.
 1928—SWAINE, JAMES M., C.B.E., B.S.A., M.Sc., Ph.D., 484 Brierwood Ave., Ottawa, Ont.
 1915—WALKER, EDMUND MURTON, B.A., M.B., 120 Cheltenham Ave., Toronto, Ont.
 1932—WHITNALL, S. E., M.A., M.D., B.Ch., M.R.C.S.

Active Members

- 1944—ANDERSON, J. A., M.Sc., Ph.D., Grain Research Laboratory, Winnipeg, Man.
 1939—ANDERSON, R. M., B.Ph., Ph.D., 58, The Driveway, Ottawa, Ont.
 1937—BAILEY, DIXON L., M.S., Ph.D., University of Toronto, Toronto, Ont.
 1952—BANNAN, M. W., Ph.D., University of Toronto, Toronto, Ont.
 1936—BERRILL, N. J., Ph.D., D.Sc., F.R.S., McGill University, Montreal, Que.
 1931—BEST, CHARLES H., C.B.E., M.A., M.D., D.Sc., F.R.C.P.(C), F.R.S., Hon. D.Sc. (Oxon.), University of Toronto, Toronto, Ont.
 1924—BOYD, WILLIAM, M.D., F.R.C.P., LL.D., University of British Columbia, Vancouver, B.C.
 1936—BRITTAIN, W. H., B.S.A., M.S., Ph.D., Macdonald College, Que.
 1939—BROWNE, J. S. L., B.Sc., M.D., Ph.D., Royal Victoria Hospital, Montreal, Que.
 1952—BURTON, A. C., M.B.E., B.Sc., M.A., Ph.D., University of Western Ontario, London, Ont.
 1939—CAMERON, THOMAS W. M., M.A., D.Sc., Ph.D., M.R.C.V.S., Macdonald College, Que.
 1933—CAMPBELL, WALTER R., M.A., M.D., F.R.C.P.(C), Medical Arts Bldg., Toronto, Ont.
 1954—CIPRIANI, A. J., B.Sc., M.D.C.M., Atomic Energy of Canada, Limited, Chalk River, Ont.
 1925—CLEMENS, W. A., M.A., Ph.D., University of British Columbia, Vancouver, B.C.
 1954—COLLIER, H. B., M.A., Ph.D., University of Alberta, Edmonton, Alta.
 1925—COLLIP, J. B., C.B.E., Ph.D., M.D., D.Sc., LL.D., F.R.S., Faculty of Medicine, University of Western Ontario, London, Ont. (Ex-President.)
 1944—CONE, WILLIAM V., B.S., M.D., Montreal Neurological Institute, Montreal, Que.
 1943—COOK, W. H., O.B.E., M.Sc., Ph.D., LL.D., F.A.I.C., National Research Council, Ottawa, Ont.
 1946—COWAN, IAN McT., Ph.D., University of British Columbia, Vancouver, B.C.
 1935—CRAIGIE, E. HORNE, Ph.D., 52 Strathgowan Ave., Toronto, Ont.
 1936—CRAIGIE, J. H., M.Sc., D.Sc., Ph.D., LL.D., F.R.S., 479 Kensington Ave., Ottawa, Ont.
 1945—CRAMPTON, E. W., B.S.A., M.Sc., Ph.D., Macdonald College, Que.
 1949—DANSEREAU, PIERRE, B.Sc.Agr., D.Sc., University of Michigan, Ann Arbor, Mich., U.S.A.
 1953—DAUPHINEE, J. A., O.B.E., M.A., Ph.D., M.D., F.R.C.P.(C), University of Toronto, Toronto, Ont.
 1952—DAVIAULT, LIONEL, B.S.A., M.Sc., D.Sc., Laval University, Quebec, Que.

- 1947—DOLMAN, CLAUDE ERNEST, M.B., B.S., D.P.H., Ph.D., M.R.C.P., University of British Columbia, Vancouver, B.C.
- 1938—DRAYTON, FRANK LISLE, B.S.A., Ph.D., 333 Fairmont Ave., Ottawa, Ont.
- 1947—DUFF, G. LYMAN, M.A., M.D., Ph.D., McGill University, Montreal, Que.
- 1951—DUGAL, L.-PAUL, M.Sc., Ph.D., Laval University, Quebec, Que.
- 1954—DUNBAR, M. J., M.A., Ph.D., McGill University, Montreal, Que.
- 1938—DYMOND, JOHN RICHARDSON, O.B.E., M.A., University of Toronto, Toronto, Ont.
- 1952—EAGLES, BLYTHE, M.A., Ph.D., University of British Columbia, Vancouver, B.C.
- 1941—ETTINGER, G. H., M.B.E., M.D., C.M., Queen's University, Kingston, Ont.
- 1948—FERGUSON, J. K. W., M.B.E., M.A., M.D., University of Toronto, Toronto, Ont.
- 1949—FISHER, K. C., M.A., Ph.D., University of Toronto, Toronto, Ont.
- 1939—FOERSTER, R. EARLE, M.A., Ph.D., Pacific Biological Station, Nanaimo, B.C.
- 1949—FRAPPIER, ARMAND, O.B.E., M.D., L. ès Sc., F.A.P.H.A., Officier d'Académie (France), University of Montreal, Montreal, Que.
- 1948—FRY, F. E. J., M.B.E., M.A., Ph.D., University of Toronto, Toronto, Ont.
- 1952—GIBBARD, JAMES, B.S.A., S.M., Department of National Health and Welfare, Ottawa, Ont.
- 1939—GIBBS, R. DARNLEY, M.Sc., Ph.D., F.L.S., McGill University, Montreal, Que.
- 1941—GOULDEN, C. H., M.S.A., Ph.D., Central Experimental Farm, Ottawa, Ont.
- 1948—GRACE, N. H., M.B.E., M.A., Ph.D., Research Council of Alberta, Edmonton, Alta.
- 1938—GRAHAM, DUNCAN ARCHIBALD, C.B.E., M.B., F.R.C.P.(C), F.R.C.P.(London), 343 Lytton Boulevard, Toronto, Ont.
- 1951—GROVES, J. WALTON, M.A., Ph.D., Department of Agriculture, Ottawa, Ont.
- 1931—GUSSOW, H. T., LL.D., F.L.S., F.R.M.S., Hon. F.R.H.S., 2975 McAnally Rd., Victoria, B.C.
- 1944—HALL, GEORGE E., B.S.A., M.Sc., M.D., Ph.D., University of Western Ontario, London, Ont.
- 1951—HAM, ARTHUR W., M.B., University of Toronto, Toronto, Ont.
- 1944—HANNA, WILLIAM F., C.B.E., M.Sc., Ph.D., Botany and Plant Pathology, Department of Agriculture, Ottawa, Ont.
- 1943—HART, J. L., M.A., Ph.D., Pacific Biological Station, Nanaimo, B.C.
- 1947—HAYES, F. RONALD, M.A., Ph.D., Dalhousie University, Halifax, N.S.
- 1949—HEARD, R. D. H., M.A., Ph.D., McGill University, Montreal, Que.
- 1953—HEIMBURGER, C. C., M.Sc.F., Ph.D., Department of Lands and Forests, Maple, Ont.
- 1951—HOPKINS, JOHN W., M.Sc., Ph.D., National Research Council, Ottawa, Ont.
- 1917—HUNTSMAN, ARCHIBALD GOWANLOCK, M.D., University of Toronto, Toronto, Ont. (Ex-President.)
- 1933—HUTCHINSON, A. H., M.A., Ph.D., University of British Columbia, Vancouver, B.C.
- 1952—JAQUES, L. B., M.A., Ph.D., University of Saskatchewan, Saskatoon, Sask.
- 1950—JOHNSON, T., B.S.A., M.Sc., Ph.D., Dominion Laboratory of Plant Pathology, University of Manitoba, Winnipeg, Man.
- 1950—KROTKOV, G., M.A., Ph.D., Queen's University, Kingston, Ont.
- 1945—LABARRE, JULES, B.Ph., L. ès Sc., D. ès Sc., University of Montreal, Montreal, Que.
- 1946—LARMOUR, R. K., M.Sc., Ph.D., Maple Leaf Milling Co., Toronto, Ont.
- 1945—LEACH, WILLIAM, M.Sc., Ph.D., D.Sc., University of Manitoba, Winnipeg, Man.
- 1951—LEBLOND, CHARLES P., M.D., Ph.D., McGill University, Montreal, Que.
- 1949—LEDINGHAM, G. A., M.Sc., Ph.D., National Research Laboratories, Saskatoon, Sask.
- 1940—LOCHHEAD, A. G., M.Sc., Ph.D., Department of Agriculture, Ottawa, Ont.
- 1924—MACKLIN, CHARLES CLIFFORD, M.B., M.D., M.A., Ph.D., University of Western Ontario, London, Ont.
- 1944—MAHEUX, GEORGES, M.A., M.Sc.A., D.Sc., 775, rue St.-Cyrille, Quebec, Que.

- 1941—MAINLAND, DONALD, M.B., Ch.B., D.Sc., F.R.S.E., New York University—Bellevue Medical Center, New York, N.Y.
- 1931—MASSON, C. L. PIERRE, M.D., University of Montreal, Montreal, Que.
- 1953—MCCALLA, A. G., M.Sc., Ph.D., University of Alberta, Edmonton, Alta.
- 1942—MCFARLANE, W. D., M.A., Ph.D., Research Division, Canadian Breweries, Ltd., 307 Fleet St. E., Toronto, Ont.
- 1942—MCHENRY, E. W., M.A., Ph.D., Connaught Laboratories, University of Toronto, Toronto, Ont.
- 1926—MEAKINS, J. C., C.B.E., M.D.C.M., M.D., LL.D., F.A.C.P., F.R.C.P.(C), F.R.S.E., Royal Victoria Hospital, Montreal, Que.
- 1945—MITCHELL, CHARLES A., D.V.Sc., D.V.M., Animal Diseases Research Institute, Hull, Que.
- 1936—MOLONEY, P. J., O.B.E., M.A., Ph.D., Connaught Laboratories, University of Toronto, Toronto, Ont.
- 1938—MOORHOUSE, VICTOR HENRY KINGSLEY, M.C., M.D., Box 569, Orangeville, Ont.
- 1950—MORIN, J. E., M.D., M.C.R.M. (C), Laval University, Quebec, Que.
- 1947—MORRELL, CLARENCE A., M.A., Ph.D., Department of Health and Welfare, Ottawa, Ont.
- 1938—MOSS, EZRA HENRY, M.A., Ph.D., University of Alberta, Edmonton, Alta.
- 1938—MURRAY, EVERITT GEORGE DUNNE, O.B.E., M.A., L.M.S.S.A., McGill University, Montreal, Que.
- 1947—NEATBY, K. W., M.A., Ph.D., Department of Agriculture, Ottawa, Ont.
- 1954—NEAVE, FERRIS, M.Sc., Ph.D., Pacific Biological Station, Nanaimo, B.C.
- 1945—NEEDLER, A. W. H., O.B.E., M.A., Ph.D., Atlantic Biological Station, St. Andrews, N.B.
- 1942—NEWTON, MARGARET, B.S.A., M.Sc., Ph.D., 2392 Beach Drive, Victoria, B.C.
- 1950—NOBLE, R. L., M.D., Ph.D., D.Sc., University of Western Ontario, London, Ont.
- 1953—ORR, J. H., M.D., C.M., F.R.C.P.(C), Queen's University, Kingston, Ont.
- 1935—PENFIELD, WILDER G., O.M., C.M.G., Litt.B., M.D., M.A., B.Sc., D.Sc., F.R.S., Montreal Neurological Institute, Montreal, Que.
- 1948—POMERLEAU, RENÉ, B.S.A., D.Sc., Laval University, Quebec, Que.
- 1946—PORSILD, A. E., M.B.E., B.A., National Museum, Ottawa, Ont.
- 1942—PRÉFONTAINE, GEORGES, M.D., Lic.Sc., 630 Davaar Ave., Montreal, Que.
- 1953—QUASTEL, J. H., D.Sc., Ph.D., A.R.C.S., F.C.I.C., F.R.I.C., F.R.S., McGill University, Montreal, Que.
- 1944—RAWSON, DONALD S., Ph.D., University of Saskatchewan, Saskatoon, Sask.
- 1954—RAYMOND, MARCEL, L.Sc., Ph.D., Jardin botanique de Montréal, Montréal, Qué.
- 1932—REED, GUILFORD B., O.B.E., M.A., B.Sc., Ph.D., LL.D., D.Sc., Queen's University, Kingston, Ont. (Ex-President.)
- 1954—ROSSITER, R. J., B.Sc., M.A., D. Phil., B.M.B.Ch., University of Western Ontario, London, Ont.
- 1942—ROUSSEAU, JACQUES, D.Sc., Jardin botanique de Montréal, Montréal, Qué.
- 1934—ROWAN, WILLIAM, D.Sc., F.Z.S., University of Alberta, Edmonton, Alta.
- 1939—SCOTT, D. A., M.A., Ph.D., F.R.S., Connaught Laboratories, University of Toronto, Toronto, Ont.
- 1941—SELYE, HANS, M.D., Ph.D., D.Sc., University of Montreal, Montreal, Que.
- 1946—SHANER, RALPH F., Ph.B., Ph.D., University of Alberta, Edmonton, Alta.
- 1935—SIFTON, HAROLD BOYD, M.A., Ph.D., University of Toronto, Toronto, Ont.
- 1940—SIMARD, L. C., M.D., F.R.C.P.(C), University of Montreal, Montreal, Que.
- 1945—SCLANDT, D. Y., M.A., M.D., Ph.D., University of Toronto, Toronto, Ont.
- 1948—SOLANDT, O. M., O.B.E., B.Sc., M.A., M.D., M.R.C.P., Defence Research Board, Ottawa, Ont.
- 1951—SPEAKMAN, H. B., D.Sc., LL.D., Ontario Research Foundation, Toronto, Ont.
- 1953—STRICKLAND, E. H., M.Sc., F.E.S.A.F., A.A.E.E., 2945 Tudor Road, Victoria, B.C.
- 1934—TAYLOR, N. B., M.D., M.R.C.S., F.R.C.S., 21 Ardwood Gate, Toronto, Ont.

- 1950—TEMPLEMAN, W., O.B.E., B.Sc., M.A., Ph.D., Newfoundland Fisheries Research Station, St. John's, Newfoundland.
- 1947—THOMPSON, I. M., B.Sc., M.B., Ch.B., F.R.S.E., Medical College, Winnipeg, Man.
- 1921—THOMPSON, W. P., M.A., Ph.D., D.Sc., University of Saskatchewan, Saskatoon, Sask. (Ex-President.)
- 1949—THOMPSON, W. R., B.S.A., D.Sc., Ph.D., F.R.S., Commonwealth Bureau of Biological Control, Ottawa, Ont.
- 1936—THOMSON, DAVID L., M.A., Ph.D., McGill University, Montreal, Que.
- 1950—TREMBLAY, J.-L., B.A.Sc., D.Sc., Laval University, Quebec, Que.
- 1934—WARDLE, R. A., M.Sc., University of Manitoba, Winnipeg, Man.
- 1930—WASTENEYS, HARDOLPH, Ph.D., 20 Howland Ave., Toronto, Ont.
- 1943—WYNNE, A. M., M.A., Ph.D., University of Toronto, Toronto, Ont.
- 1940—WYNNE-EDWARDS, V. C., M.A., Marischall College, University of Aberdeen, Aberdeen, Scotland.
- 1935—YOUNG, E. GORDON, M.Sc., Ph.D., Dalhousie University, Halifax, N.S.

CORRESPONDING MEMBERS

SECTION I

DE LACRETELLE, JACQUES, de l'Académie française, Paris.

SECTION II

SIEBERT, WILBUR H., M.A., 182 West Tenth Ave., Columbus, Ohio, U.S.A.

SECTION IV

WATTS, W. W., Imperial College of Science and Technology, London, England.

SECTION V

HANES, C. S., Ph.D., Sc.D., F.R.S., 58 Kendal Ave., Toronto, Ont.

MEDAL AWARDS

MEDAILLE PIERRE-CHAUVEAU

(Founded 1952)

- 1952—PIERRE DAVIAULT
- 1953—B. K. SANDWELL, LL.D., D.C.L.
- 1954—GÉRARD MORISSET, B.A., LL.L.

FLAVELLE MEDAL

(Founded 1925)

- 1944—V. E. HENDERSON, M.A., M.B., F.R.C.P.(C)
- 1945—R. B. THOMSON, B.A.
- 1946—WILLIAM ROWAN, D.Sc., F.Z.S.
- 1947—G. B. REED, O.B.E., M.A., B.Sc., Ph.D., LL.D.
- 1948—MARGARET NEWTON, B.S.A., M.Sc., Ph.D.
- 1949—W. P. THOMPSON, M.A., Ph.D., D.Sc.
- 1950—C. H. BEST, C.B.E., M.A., M.D., D.Sc., F.R.C.P.(C), F.R.S., Hon. D.Sc.(Oxon.)
- 1951—WILDER G. PENFIELD, C.M.G., Litt.B., M.D., M.A., B.Sc., D.Sc., F.R.S.
- 1952—A. G. HUNTSMAN, M.D.
- 1953—E. G. D. MURRAY, O.B.E., M.A., L.M.S.S.A.
- 1954—D. A. SCOTT, M.A., Ph.D., F.R.S.

HENRY MARSHALL TORY MEDAL

(Founded 1943)

- 1943—JOHN L. SYNGE, M.A., Sc.D., F.R.S.
1944—FRANK ALLEN, M.A., Ph.D., LL.D.
1945—OTTO MAASS, C.B.E., M.Sc., Ph.D., LL.D., F.R.S.
1946—JOHN S. FOSTER, B.Sc., Ph.D., F.R.S.
1947—E. F. BURTON, O.B.E., Ph.D.
1949—H. S. M. COXETER, Ph.D., F.R.S.
1951—T. THORVALDSON, A.M., Ph.D.
1953—G. HERZBERG, M.A., Dipl.Ing., Dr.Ing., F.R.S.

LORNE PIERCE MEDAL

(Founded 1926)

- 1944—AUDREY ALEXANDRA BROWN
1945—L'abbé FÉLIX-ANTOINE SAVARD
1946—CHARLES N. COCHRANE, M.A. (posthumously)
1947—DOROTHY LIVESAY (Mrs. Duncan Macnair)
1948—GABRIELLE ROY (Mme Carbotte)
1949—JOHN MURRAY GIBBON, B.A., D. ès L.
1950—MARIUS BARBEAU, LL.L., B.Sc., D. ès L., Dipl.Anth.
1951—E. K. BROWN, B.A., D. ès L. (posthumously)
1952—HUGH MACLENNAN, M.A., Ph.D.
1953—EARLE BIRNEY, Ph.D.
1954—ALAIN GRANDBOIS

TYRRELL MEDAL

(Founded 1928)

- 1944—HAROLD A. INNIS, M.A., Ph.D.
1945—FRED LANDON, M.A. LL.D., D.Litt.
1946—A. L. BURT, M.A.
1947—A. R. M. LOWER, Ph.D., LL.D.
1948—Le chanoine LIONEL GROULX, Ph.D., D.Th., D. ès L.
1949—REGINALD G. TROTTER, M.A., Ph.D., D.C.L.
1950—JOHN BARTLET BREBNER, M.A., B. Litt., Ph.D., Litt.D.
1951—JEAN BRUCHÉSI, LL.L., D.Sc.Pol., D. ès L., and
D. G. CREIGHTON, M.A., LL.D.
1952—C. B. SISSONS, LL.D.
1953—SÉRAPHIN MARION, M.A., D. ès L.
1954—G. DE T. GLAZEBROOK

WILLET G. MILLER MEDAL

(Founded 1943)

- 1943—NORMAN LEVI BOWEN, M.A., Ph.D., Sc.D.
1945—MORLEY E. WILSON, Ph.D.
1947—F. H. MCLEARN, B.E., Ph.D.
1949—H. V. ELLSWORTH, M.A., Ph.D.
1951—J. E. HAWLEY, M.A., Ph.D.
1953—C. H. STOCKWELL, B.A.Sc., Ph.D.

LIST OF PRESIDENTS

1944-1945	J. K. ROBERTSON, M.A.
1945-1946	E. S. MOORE, M.A., Ph.D.
1946-1947	HAROLD A. INNIS, M.A., Ph.D.
1947-1948	W. P. THOMPSON, M.A., Ph.D., D.Sc.
1948-1949	GUSTAVE LANTÔT, D.ès L., LL.M., LL.D., D.Sc.Pol., C.R.
1949-1950	JOSEPH A. PEARCE, M.A., Ph.D.
1950-1951	J. J. O'NEILL, M.Sc., Ph.D.
1951-1952	H. F. ANGUS, M.A., B.C.L., LL.D.
1952-1953	G. B. REED, O.B.E., M.A., B.Sc., Ph.D., LL.D.
1953-1954	JEAN BRUCHÉST, LL.L., D.Sc.Pol., D. ès L.
1954-1955	E. W. R. STEACIE, O.B.E., Ph.D., D.Sc., F.R.S.

LIST OF PRESIDENTS OF SECTIONS

SECTION I

1944-1945	MAURICE HÉBERT
1945-1946	SÉRAPHIN MARION
1946-1947	PIERRE DAVIAULT
1947-1948	ARTHUR SAINT-PIERRE
1948-1949	LÉOPOLD HOULÉ
1949-1950	Le chanoine GEORGES ROBITAILLE
1950-1951	DONATIEN FRÉMONT
1951-1952	L'abbé ARTHUR MAHEUX
1952-1953	CLAUDE MELANÇON
1953-1954	GÉRARD MORISSET
1954-1955	JEAN CHAUVIN

SECTION II

1944-1945	W. H. ALEXANDER
1945-1946	D. C. HARVEY
1946-1947	ALEXANDER BRADY
1947-1948	R. K. GORDON
1948-1949	B. K. SANDWELL
1949-1950	A. G. DORLAND
1950-1951	W. A. MACKINTOSH
1951-1952	A. S. P. WOODHOUSE
1952-1953	A. R. M. LOWER
1953-1954	F. M. SALTER
1954-1955	D. A. MACGIBBON

SECTION III

1944-1945	J. A. PEARCE
1945-1946	C. T. SULLIVAN
1946-1947	E. L. HARRINGTON
1947-1948	E. W. R. STEACIE
1948-1949	J. S. FOSTER
1949-1950	C. S. BEALS
1950-1951	H. G. THODE
1951-1952	GERHARD HERZBERG
1952-1953	R. L. JEFFERY
1953-1954	P. E. GAGNON
1954-1955	R. M. PETRIE

SECTION IV

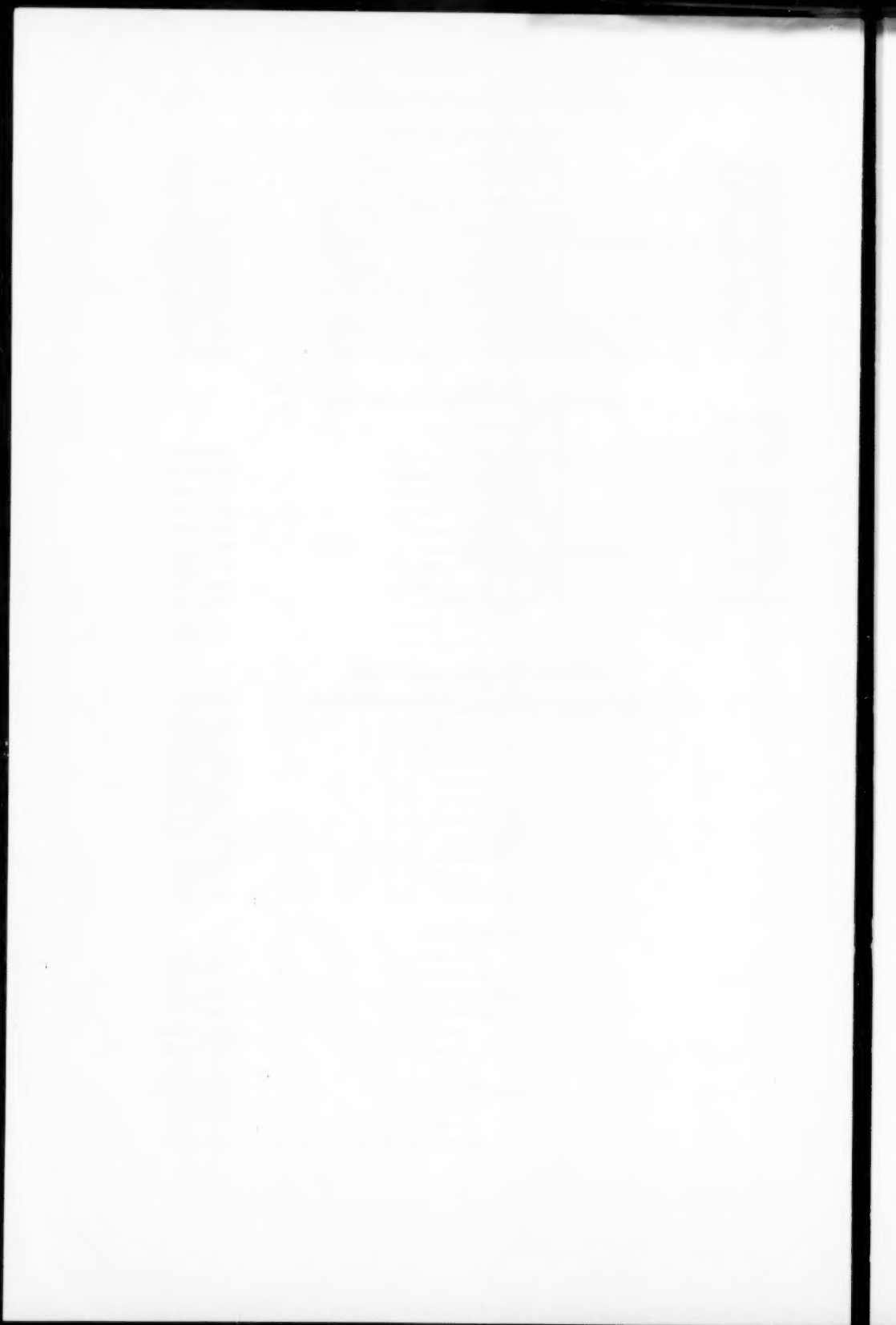
1944-1945	. . . . .	J. S. DE LURY
1945-1946	. . . . .	B. R. MacKAY
1946-1947	. . . . .	BRUCE ROSE
1947-1948	. . . . .	F. J. ALCOCK
1948-1949	. . . . .	VICTOR DOLMAGE
1949-1950	. . . . .	T. L. TANTON
1950-1951	. . . . .	P. S. WARREN
1951-1952	. . . . .	G. S. HUME
1952-1953	. . . . .	G. HANSON
1953-1954	. . . . .	T. H. CLARK
1954-1955	. . . . .	J. B. MAWDSLEY

SECTION V

1944-1945	. . . . .	ROBERT NEWTON
1945-1946	. . . . .	B. P. BABKIN
1946-1947	. . . . .	J. R. DYMOND
1947-1948	. . . . .	E. GORDON YOUNG
1948-1949	. . . . .	A. H. HUTCHINSON
1949-1950	. . . . .	T. W. M. CAMERON
1950-1951	. . . . .	L. C. SIMARD
1951-1952	. . . . .	C. L. HUSKINS
1952-1953	. . . . .	W. A. CLEMENS
1953-1954	. . . . .	R. D. GIBBS
1954-1955	. . . . .	E. G. D. MURRAY

ASSOCIATED ORGANIZATIONS

The Canadian Institute of Mining and Metallurgy



THE ROYAL SOCIETY OF CANADA



REPORT OF THE HONORARY SECRETARY FOR THE YEAR 1953-1954

COUNCIL MEETINGS

The Council met three times during the year to conduct the affairs of the Society. The Report of Council presented to the seventy-third annual meeting of The Royal Society of Canada contains a complete account of the year's business.

The Sections recommended the election of thirty-two Fellows. Their names, and the Sections to which they were elected, appear under "Annual Meeting."

Four medals were awarded by the Society:

Médaille Pierre-Chauveau to M. Gérard Morisset

Flavelle Medal to Dr. David A. Scott

Lorne Pierce Medal to M. Alain Grandbois

Tyrrell Medal to Mr. G. P. de T. Glazebrook

(Citations are given on pages 30-3).

On the recommendation of the Scholarships Board one post-doctoral and three pre-doctoral scholarships were awarded to the following:

William Robbins, of Vancouver, a post-doctoral scholarship for the study of the writings of Matthew Arnold, at the British Museum.

Miss Mindele C. Black, of Winnipeg, a pre-doctoral scholarship for research on aspects of the grand style in Milton's *Paradise Lost*, at Cambridge and Harvard Universities.

Mr. John M. Robson, of Toronto, a pre-doctoral scholarship for study of the social and political philosophy of John Stuart Mill, at the University of London.

Mlle Cécile Cloutier, of Quebec, a pre-doctoral scholarship for the study of modern French and Canadian poetry, in Paris.

Two Rutherford Memorial Fellowships were awarded. Dr. E. L. Lomon was awarded a fellowship to supplement that which he received from the National Research Council. He will study at the Institute for Theoretical Physics of the University of Copenhagen. Dr. F. A. E. Pirani, whose fellowship is financed entirely by The Royal Society of Canada, will undertake research at the Dublin Institute for Advanced Studies.

The third Canadian Government Overseas Awards competition was held in 1954. The Awards Committee, under the chairmanship of Dr. W. Kaye Lamb, felt it advisable to advance the deadline for application to

March 15, in order to allow more time for processing of the applications. Initially, some delay was caused by the fact that the Department of External Affairs had not decided how payments were to be made. It was not possible to proceed with the printing of forms until this was decided and, as a result, less time than was desirable was allowed between the announcement and the deadline. More than three hundred and seventy applications were received; some of these were withdrawn, and the final count was 364. Of these, 170 were applications for fellowships and 194 were applications for scholarships.

Several meetings of the Awards Committee were held to screen the candidates in a preliminary way. As in previous years, Mr. Walter Herbert, of the Canada Foundation, rendered valuable service in reviewing applications. The final meeting was held on May 6. In addition to the members of the Awards Committee, it was attended by Mr. Maurice Lebel, Dr. J. A. Corry, and Dr. S. Beatty, of the Selection Committee on Royal Society of Canada Research Scholarships; Mr. Walter Herbert; Mr. R. H. Charlebois, of the Canadian Arts Council; and Dr. James Gibson, representing the National Conference of Canadian Universities.

In making the awards, preference was given, all else being equal, to applicants with no European experience, and creative artists were given preference over those who are only performers.

It was decided that thirteen fellowships and fourteen scholarships should be awarded. The winners of the 1954-1955 Awards follow:

<i>Fellowships</i>	<i>Scholarships</i>
<i>History</i>	<i>History</i>
Charles C. Bayley	Harold B. Attin*
Joseph L. Lamontagne	
<i>French Literature</i>	<i>Music</i>
Alfred E. Carter	Yves Bédard*
	William K. Rogers*
<i>Journalism</i>	<i>Semitic Languages</i>
Cyrille Felteau	Rev. E. G. Clarke*
<i>Art</i>	<i>Art</i>
Armand Filion	G.-H. de Niverville*
Jean-Paul Lemieux	James S. Willer
<i>Art Education</i>	<i>Sociology</i>
J. Doris Hunt	Fernand Dumont*
J. W. B. MacDonald	

*Eight scholarships were renewals of awards made last year. No fellowships were renewed.

Mathematics

Israel Halperin

Poetry

Anne Hébert

Political Science

J. H. Stewart Reid

Theatre

Dorothy M. Somerset

Philology

Roch Valin

Geography

Fernand Grenier*

Zoology

Miles Keenleyside*

French Literature

Edward A. Bird

Philosophy

Orville G. Connor

Mathematics

James G. Larocque

Teaching

Roméo-A. Leblanc

Law

André Morel

The Publications Committee did not meet but by a vote by mail authorized the Acting Honorary Editor to make certain changes in the format of the Proceedings and Transactions. These changes should reduce the cost of publication substantially with little or no loss, indeed possibly with some gain, in looks. One more pamphlet was published during the year, *The World War against Poverty*, by F. R. Scott, R. A. MacKay, and A. E. Ritchie.

The Committee on Organization, which had been formed the preceding year, met several times to discuss revision of the By-laws. Although the revision was not completed, little remains to be done.

The Committee on Plans met three times during the year. It discussed in some detail the question of public relations, medals, and an invitation to the British Association for the Advancement of Science. It recommended that the Executive Secretary should take any necessary steps to secure good press relations; no new medals should be awarded by the Society under the name of a donor; any future medals, no matter how endowed, should be called Royal Society of Canada Medals. The proposed invitation to the British Association for the Advancement of Science, to hold its 1957 meeting in Canada, was dropped, because such a meeting would conflict with the 75th anniversary celebration of the Society.

Mr. James C. McKegney was appointed Executive Secretary and took up his duties on August 10, 1953.

There were six retirements: L'abbé Félix-Antoine Savard, Section I; David O. Evans and Otis J. Todd, Section II; C. E. Cairnes, Section IV; L. E. Kirk and A. Bruce Macallum, Section V.

ANNUAL MEETING

The seventy-third annual meeting was opened in the Residence Auditorium, University of Manitoba, at 10 A.M., May 31. The following Fellows registered:

SECTION I

Bouchard, Georges; Brouillette, Benoît; Bruchési, Jean; Carbotte, Mme Gabrielle Roy; Chauvin, Jean; Daviault, Pierre; Falardeau, Jean-C.; Frémont, Donatien; L'Heureux, Eugène; Melançon, Claude; Morisset, Gérard; Plouffe, Adrien; Régis, L. M., O. P.; Roy, Antoine; Vallerand, Jean

SECTION II

Alexander, Henry; Anderson, F. H.; Bladen, V. W.; Brady, Alexander; Britnell, G. E.; Clark, S. D.; Collin, W. E.; Creighton, D. G.; Denomy, Alex J.; Dorland, A. G.; Duthie, G. I.; Elliott, G. A.; Ferguson, G. V.; Fieldhouse, H. N.; Fowke, V. G.; Gordon, R. K.; Graham, W. C.; Johnson, Skuli; Lamb, W. Kaye; Leechman, Douglas; Long, M. H.; Longley, R. S.; Lower, A. R. M.; MacGibbon, D. A.; MacGregor, D. C.; MacKenzie, N. A. M.; Marshall, Herbert; Muckle, Rev. J. T.; Phelan, Gerald B.; Priestley, F. E. L.; Rose, W. J.; Sage, Walter N.; Salter, F. M.; Scott, F. R.; Sissons, C. B.; Smith, S. E.; Soward, F. H.; Stacey, C. P.; Stanley, George F. G.; Timlin, Mabel F.; Underhill, F. H.; Woodhouse, A. S. P.

SECTION III

Babbitt, J. D.; Boyle, R. W.; Campbell, A. N.; Campbell, J. W.; Currie, B. W.; Demers, Pierre; Douglas, A. E.; Duckworth, H. E.; Field, G. S.; Gagnon, P. E.; Gaudry, R.; Hachey, H. B.; Henderson, John T.; Henderson, W. J.; Herzberg, Gerhard; Hurst, D. G.; James, R. D.; Jeffery, R. L.; Johns, H. E.; Katz, Leon; Kinsey, B. B.; Laurence, G. C.; Lewis, W. B.; McCallum, K. J.; McKinley, D. W. R.; McLay, A. B.; Macphail, M. S.; Niven, C. D.; Parkin, J. H.; Risi, Joseph; Robinson, G. de B.; Rose, D. C.; Sargent, B. W.; Scherk, Peter; Shrum, G. M.; Smith, H. Grayson; Spinks, J. W. T.; Steacie, E. W. R.; Thode, H. G.; Thomson, Andrew; Thorvaldson, T.; Watson, W. H.; Welsh, H. L.; Williams, W. L. G.; Wright, K. O.; Wyman, Max

SECTION IV

Alcock, F. J.; Bostock, H. S.; Brownell, G. M.; Campbell, Neil; Clark, T. H.; Edmunds, F. H.; Fraser, E. J.; Gunning, H. C.; Hume, G. S.; James, W. F.; Jones, I. W.; MacKenzie, G. S.; Mawdsley, J. B.; Moore, E. S.; Robinson, S. C.; Roliff, W. A.; Russell, L. S.; Satterly, J.; Tanton, T. L.; Warren, H. V.; Warren, P. S.; Wickenden, R. T. D.; Wilson, J. Tuzo; Williams, M. Y.

SECTION V

Anderson, J. A.; Burton, A. C.; Cameron, T. W. M.; Cipriani, A. J.; Clemens, W. A.; Collier, H. B.; Collip, J. B.; Cook, W. H.; Craigie, E. Horne; Dolman, C. E.; Drayton, F. L.; Dunbar, M. J.; Dymond, J. R.; Fisher, K. C.; Foerster, R. E.; Fry, F. E. J.; Gibbs, R. D.; Grace, N. H.; Hanna, W. F.; Hart, J. L.; Hayes, F. R.; Krotkov, G.; Leach, William; Lochhead, A. G.; Maheux, Georges; McCalla, A. G.; Mitchell, C. A.; Murray, E. G. D.; Neave, Ferris; Needler, A. W. H.; Newton, Margaret; Rawson, D. S.; Reed, G. B.; Rossiter, R. J.; Rowan, William; Scott, D. A.; Shaner, R. F.; Sifton, H. B.; Templeman, W.; Thompson, I. M.; Thompson, W. P.; Wardle, R. A.; Young, E. Gordon

The meeting was called to order by the President, Dr. Jean Bruchési. Professor W. J. Wainess, Dean of Arts and Science, welcomed the Fellows of the Royal Society of Canada and visitors to the University on behalf of the President, Dr. A. H. S. Gillson, who was prevented by serious illness from being present.

The President called for a motion to approve the minutes of the last meeting. It was moved by Dr. D. A. MacGibbon, seconded by Dr. R. F. Shaner, that the minutes be approved. CARRIED.

The election of thirty-two new Fellows, as listed in the Report of Council, was moved by Dr. G. M. Shrum, seconded by Professor F. H. Soward. CARRIED:

Jean-Charles Bonenfant, Benoît Brouillette, Jean-Charles Falardeau, Jean Vallerand, *Section I*; A. Earle Birney, G. I. Duthie, G. V. Ferguson, V. G. Fowke, Skuli Johnson, R. S. Longley, D. C. MacGregor, E. T. Salmon, *Section II*; A. E. Douglas, H. E. Duckworth, Roger Gaudry, Paul-A. Giguère, R. N. H. Haslam, D. G. Hurst, B. B. Kinsey, K. J. McCallum, J. Risi, Kenneth O. Wright, *Section III*; W. F. James, S. C. Robinson, W. A. Roliff, Jack Satterly, *Section IV*; A. J. Cipriani, H. B. Collier, M. J. Dunbar, Ferris Neave, Marcel Raymond, R. J. Rossiter, *Section V*.

Those present were formally presented to the President by the presidents of the respective sections. They received diplomas and signed the Charter Book. M. J.-C. Bonenfant, Dr. A. E. Birney, Dr. E. T. Salmon, Dr. P.-A. Giguère, and M. Marcel Raymond were absent. Dr. Neil Campbell, Dr. Douglas Leechman, and Dr. W. J. Rose, who were elected in 1953, received diplomas and signed the Charter Book.

In the absence of the Honorary Secretary, Major Pierre Daviault presented the Report of Council and asked that it be referred to the Sections. A motion to this effect was made by Dr. B. W. Sargent and seconded by Dr. L. Katz. CARRIED.

The meeting adjourned at 11.10 A.M.

On Sunday evening, May 30, the President, Dr. Jean Bruchési, entertained the members of the Council and their wives and several Provincial, Civic and University dignitaries at a dinner in the Fort Garry Hotel.

Sectional meetings were held May 31, June 1 and June 2.

On the evening of Monday, May 31, the University of Manitoba played host to the Royal Society of Canada at a splendid dinner held in the cafeteria of the Students' Residence. Immediately after the dinner, the Fellows and their guests assembled in the Residence Auditorium. Medals were presented to the winners, Mr. G. de T. Glazebrook receiving the Tyrrell Medal *in absentia*. Dr. E. W. R. Steacie took the chair and called upon the President to deliver his Presidential Address, "Regards sur la Société royale du Canada."

The Society was royally entertained during its three days in Winnipeg. In addition to the Monday evening dinner given by the University, there were: a cocktail party, given by an anonymous donor, on Tuesday afternoon in the Jade Room of the Fort Garry Hotel; a reception and concert, given by St. Boniface College, on Tuesday evening; a luncheon, in the pavilion of Assiniboine Park, tendered by the City of Winnipeg; and a dinner on Wednesday evening for the Royal Society of Canada and other Learned Societies, in the Residence Auditorium, at which the Province of Manitoba played host. A committee under the direction of Mrs. L. F. S. Ritcey arranged delightful entertainment for the ladies.

The second general meeting of the Society was held at 3.00 P.M., June 2.

The Report of the General Nominating Committee was received. It was moved by Dr. P. E. Gagnon, seconded by Dr. W. P. Thompson, that the report be adopted. CARRIED.

Dr. Steacie expressed his appreciation of the honour of being elected President, and his thanks to Dr. Bruchési for the excellent way he had run the Society in 1953-1954.

Reports were received from the Sections.

In its report, Section III moved that the By-laws be suspended to allow Section III to elect twelve new Fellows. A lengthy discussion ensued in which it was asked that the original motion be amended in such a way that Section V, also, should be allowed to elect twelve new Fellows. The motion was defeated.

It was moved by Major Daviault, seconded by Dr. N. H. Grace, that the Report of Council, as presented to the Society be adopted. CARRIED.

Dr. N. A. M. MacKenzie moved that a vote of thanks be extended to the University of Manitoba and its administration for the generous hospitality shown the Society and for its planning of the meeting. In making the motion, Dr. MacKenzie expressed his own deep personal regret, and that of the Society, at the serious illness which had prevented Dr. A. H. S. Gillson, President of the University of Manitoba, from attending any of the meetings of the Society. M. Gérard Morisset seconded Dr. MacKenzie's motion. CARRIED.

Other expressions of thanks were:

To the City of Winnipeg, for the luncheon at Assiniboine Park. Moved by Dr. R. D. James, seconded by Dr. Peter Scherk. CARRIED.

To St. Boniface College, and L'Association des Canadiens français du Manitoba, for the entertainment on Tuesday evening. Moved by Dr. T. W. M. Cameron, seconded by Dr. D. A. MacGibbon. CARRIED.

To the Province of Manitoba, for arranging a dinner for the Royal Society of Canada and other Learned Societies on Wednesday evening. Moved by Dr. J. F. Henderson, seconded by Dr. E. S. Moore. CARRIED.

To the organization which sponsored the cocktail party held in the Jade Room of the Fort Garry Hotel on Tuesday afternoon. Moved by Dr. P. E. Gagnon, seconded by Dr. I. M. Thompson. CARRIED.

To the members of the Press for their understanding co-operation in giving publicity to the proceedings of the meeting. Moved by Dr. H. E. Duckworth, seconded by Dr. D. W. R. McKinley. CARRIED.

To the out-going President and Council, for the excellent way in which they had conducted the affairs of the Society in 1953-1954. Moved by Col. C. P. Stacey, seconded by Dr. G. B. Reed. CARRIED.

The new president, Dr. E. W. R. Steacie, adjourned the meeting.

An Oceanography session was held at 8.30 P.M., Wednesday.

PRESENTATION OF MEDALS

MÉDAILLE PIERRE-CHAUVEAU

Gérard Morisset

MONSIEUR LE PRÉSIDENT:

Par sa contribution, aussi précieuse qu'abondante, à la connaissance, à la conservation et à la restauration des trésors artistiques du Québec, M. Gérard Morisset a rendu et rend encore à sa province et à son pays, d'incalculables services. On lui doit d'avoir fait, le premier, non seulement l'inventaire des œuvres d'art du Canada français, mais aussi d'avoir écrit, le premier, l'histoire de son architecture, de sa peinture, de sa sculpture et de ses arts mineurs et, tout cela, dans une langue admirable.

Né à Cap-Santé en 1898, Monsieur Morisset fit ses études classiques à Lévis et légales à L'Université Laval de Québec. Diplômé de l'Ecole du Louvre après soutenance d'une thèse sur la Peinture au Canada français, directeur de L'Inventaire des Œuvres d'Art de la Province de Québec, secrétaire de la Commission des Monuments historiques, président de la Société historique de Québec, conservateur du Musée de la province, élu à la Société royale en 1943, M. Gérard Morisset a publié quinze ouvrages et fut deux fois lauréat des Concours littéraires de la province de Québec.

JEAN CHAUVIN

FLAVELLE MEDAL

David Aylmer Scott

MR. PRESIDENT:

David Aylmer Scott is one of Canada's most distinguished biochemists. He was born and brought up in the Province of Ontario. His mother was Mary McKenzie whose father came from Cape Breton, Nova Scotia, to settle in Bruce County. His father, James Robert Scott, was born in Walkerton after his parents had moved from Scotland to Canada. It was in this beautiful part of the country—where "the Bruce beckons"—that David Scott grew up. He had many interests but on entering the University of Toronto his attention was centred on Chemistry. He received his Bachelor's degree in 1920, his Master's in 1922 and his Ph.D. in 1925. In 1922 he played a very prominent role in the large-scale preparation of insulin and subsequently was instrumental in making possible great advances in the purification of the material. In extending his researches he discovered the presence of zinc in crystalline insulin and this work proved to be one of the foundations on which the development of slow-acting insulins is based. With Dr. Albert Fisher he developed protamine-zinc-insulin.

Dr. Scott's work on the preparation, purification, and crystallization of heparin has also been of outstanding quality and practical importance. Much of this work was done in co-operation with Dr. Arthur Charles.

Dr. Scott's researches have illuminated other fields but his investigations on insulin, on heparin, on carbonic anhydrase, and on the hormones of the posterior pituitary gland, are the major landmarks in his scientific career.

Dr. Scott was elected to the Royal Society of Canada in 1939 and to the Royal Society of London in 1949. He has been for many years a scientist of international fame. His friends have found him not only a most generous and helpful colleague but a man of kindly spirit and deep loyalties. He is a most worthy recipient of the award of this very high honour from the Royal Society of Canada—the Flavelle Medal.

CHARLES H. BEST

LORNE PIERCE MEDAL

Alain Grandbois

MONSIEUR LE PRÉSIDENT:

C'est un plaisir et un privilège pour moi de présenter pour la Médaille Lorne-Pierce M. Alain Grandbois qui mérite bien cet honneur.

M. Grandbois est né dans le Québec où sa famille, des deux côtés, a été établie dès le dix-septième siècle. Il a fait ses études de Droit à l'Université Laval, et a été admis au Barreau de Québec en 1925. Mais sa vie n'a pas été borné au Canada; il a voyagé pendant seize ans ou plus en Europe, en Afrique, dans le Proche-Orient, et en Chine. Par conséquent, sa pensée et son œuvre n'ont rien de provincial ni dans leur portée ni dans leur qualité.

Cela est manifesté par le titre même d'un programme de continuité hebdomadaire qu'il a assuré pendant deux ou trois ans aux Ondes Internationales de la Radio-Canada. C'était intitulé, *Visages du monde*. Un autre de ses programmes était consacré à la discussion des écrivains canadiens. Par ces programmes, M. Grandbois se montrait cosmopolite dans ses intérêts et responsable devant son siècle.

M. Grandbois a publié les livres suivants:

Né à Québec (Paris, 1933)

Poèmes (Hankéou, Chine, 1934)

Les voyages de Marco Polo (Grand Prix David, Montréal, 1941)

Avant le chaos (Montréal, 1945)

Les îles de la nuit (Grand Prix David, Montréal, 1947)

Les rivages de l'homme (Québec, 1948)

Il a en préparation un livre de poèmes intitulé *Délivrance du jour*, et un récit en prose, *Saga canadienne-française*.

Né à Québec est un récit de la vie et des recherches de Louis Jolliet, le découvreur du Mississippi, de la sœur duquel M. Grandbois est lui-même descendu. Le style de ce livre est moderne, brusque, mais évocateur. Sa maîtrise se révèle encore davantage dans *Les voyages de Marco Polo* —

et il est caractéristique de M. Grandbois, et de ses intérêts et de sa manière de penser, que le héros de son deuxième œuvre en prose, n'est pas celui du premier, est un des grands explorateurs du monde. A ce livre, la vie et les voyages en Chine de M. Grandbois lui-même donnent une autorité vraie. *Avant le chaos* est un recueil de nouvelles, publié en 1945, qui montrent non seulement le sens de responsabilité de M. Grandbois envers les hommes de son siècle, mais aussi les richesses de ses ressources intérieures.

Un esprit un peu mélancolique, inévitable en ce temps-ci chez les hommes qui méditent, informe la poésie de M. Grandbois. Néanmoins, en quelque façon, ses poèmes sont tels que sa prose; on dirait que M. Grandbois est lui-même explorateur — ou peut être un explorateur manqué; sa poésie est devenue une sublimation. Moderne, évocatrice, elle a dans *Les îles de la nuit* et dans *Les voyages de l'homme* une qualité de prolongement incantatoire. Il s'intéresse beaucoup au moment bref de l'éternité dans lequel le genre humain se trouve épousé à la mort; et on croirait qu'au fond de ses poèmes se dresse l'esprit de Marco Polo, l'esprit de Louis Jolliet, cherchant une issue au désespoir spirituel profond qui afflige un si grand nombre de gens modernes.

Cet esprit qui cherche, M. le Président, doit être encouragé; et j'avoue éprouver un plaisir personnel qu'il est en train d'être encouragé — par la Société royale du Canada. De plus, parce que la plupart de nos écrivains canadiens sont nés à l'étranger, je suis vraiment heureux de présenter pour la Médaille Lorne-Pierce un homme qui est un vrai Canadien depuis plus de trois cents ans !

F. M. SALTER

TYRRELL MEDAL

G. de T. Glazebrook

MR. PRESIDENT:

I have the honour to present for the Tyrrell Medal, Mr. G. de T. Glazebrook of the Canadian Department of External Affairs.

Mr. Glazebrook was born at London, Ontario, in 1900. He attended Upper Canada College, and was graduated B.A. from the University of Toronto in 1922, and M.A., Oxford, in 1924. From 1925 to 1941 and from 1946 to 1948, he held an appointment in History at the University of Toronto; and from 1942 to 1946 he acted as Special Wartime Assistant in the Department of External Affairs. In 1948 he returned to that Department, and is at present attached to the Canadian Embassy at Washington, D.C. He has been a member of the editorial board of the *Canadian Historical Review*, and in 1948 was Editor for the Champlain Society.

The most important published works of Mr. Glazebrook are the following:

Sir Charles Bagot in Canada, 1929

Sir Edward Walker, 1933

The Hargrave Correspondence, 1938
A History of Transportation in Canada, 1938
Canadian External Relations, 1942
Canada at the Paris Peace Conference, 1942
A History of Canadian External Relations, 1950
A Short History of Canada, 1950

In addition to this impressive list of books, Mr. Glazebrook has published many individual articles and chapters in collaborative works.

In several directions Mr. Glazebrook has broken new ground. His early *History of Transportation in Canada* is an example of this pioneer spirit, and the *History of Canadian External Relations* is the only satisfactory work on the subject. His *Short History of Canada* is not without rivals in the field, but it is a sane and distinguished piece of work, an interpretation of Canada for Canadians.

Mr. Glazebrook's writing is notable for its smooth flow and happy phrasing in a field where these qualities are by no means usual. He writes in an even, judicious temper; and his work, especially on the subject of Canadian external relations, is unlikely to be surpassed for many years to come.

It is regrettable that, in the absence of the Canadian ambassador from Washington, Mr. Glazebrook is unable to be present. May I assure you, Mr. President, that in granting the Tyrrell Medal to Mr. Glazebrook, the Royal Society of Canada does honour to itself.

F. M. SALTER

REPORTS OF SECTIONS

RAPPORT DE LA SECTION I

La Section I a tenu quatre réunions auxquelles ont assisté quinze sociétaires : Mme Gabrielle Roy Carbotte, MM. Georges Bouchard, Benoît Brouillette, Jean Bruchési, Jean Chauvin, Pierre Daviault, Donatien Frémont, Jean-Charles Falardeau, Eugène L'Heureux, Claude Melançon, Gérard Morisset, Adrien Plouffe, R. P. Louis-Marie Régis, M. Antoine Roy, M. Jean Vallerand, et quelques visiteurs.

Une séance conjointe avec la Section II a été consacrée aux « French Settlements in Canada West of Lake Superior ». Deux de nos sociétaires ont pris part au symposium.

La Section I a consacré une séance à la discussion des affaires courantes. Elle a pris connaissance en tout ou en partie des onze communications inscrites au programme.

La démission de Mgr F. A. Savard est acceptée.

Il est proposé par M. Claude Melançon, appuyé par le R.P. L.-M. Régis, que M. Léo-Paul Desrosiers soit rayé des cadres.

La Section I prie le Conseil général de déclarer deux fauteuils vacants en 1954.

La Section a adopté le rapport du Conseil.

La Section regrette le décès de trois de ses membres : MM. Pierre-Georges Roy, Léopold Houlié et Edouard Montpetit.

La Section I approuve le principe de la célébration, en 1957, du 75^e anniversaire de fondation de la Société royale du Canada.

Les élections ont donné les résultats suivants :

Président : M. JEAN CHAUVIN

Vice-Président : M. EUGÈNE L'HEUREUX

Secrétaire : M. JEAN-MARIE GAUVREAU (douzième terme)

Représentant additionnel au Conseil : M. CLAUDE MELANÇON

Comité de lecture : MM. LÉON LORRAIN, DONATIEN FRÉMONT, ADRIEN PLOUFFE

Comité de la médaille Chauveau : MM. JEAN CHAUVIN, EUGÈNE L'HEUREUX, JEAN-MARIE GAUVREAU, PIERRE DAVIAULT, BENOÎT BROUILLETTE

Comité de la médaille Lorne Pierce : MM. JEAN CHAUVIN, EUGÈNE L'HEUREUX, ADRIEN PLOUFFE

Comité de la médaille Tyrrell : MM. JEAN CHAUVIN, EUGÈNE L'HEUREUX, ANTOINE ROY

Comité des nominations : MM. CLAUDE MELANÇON et ANTOINE ROY

Comité des candidatures : (nouveaux membres) MM. JEAN CHAUVIN, EUGÈNE L'HEUREUX, ANTOINE ROY, JEAN-MARIE GAUVREAU, PIERRE DAVIAULT, GÉRARD MORISSET

Comité des bourses : MM. JEAN BRUCHÉSI, MAURICE LEBEL, RR. PP. LOUIS-MARIE RÉGIS, GEORGES-HENRI LÉVESQUE, M. JEAN VALLERAND

Comité du programme : MM. JEAN CHAUVIN, EUGÈNE L'HEUREUX, JEAN-MARIE GAUVREAU

Editeur : M. ADRIEN PLOUFFE

Au nom du secrétaire M. Jean-Marie Gauvreau, je propose (Adrien Plouffe), appuyé par M. Antoine Roy, que le rapport de la Section I soit adopté.

REPORT OF SECTION II

Section II held six meetings at two of which business of the Section was transacted. Forty-one members attended, and there were many visitors. In addition to the President's address, thirteen papers were read. Special features were the symposium on Education, "So Little for the Mind," and the joint session with Section I on "French Settlements in Canada West of Lake Superior."

The following officers and committee members were elected:

President: D. A. MACGIBBON

Vice-President: J. S. THOMSON

Secretary: V. W. BLADEN

Additional member of Council: S. D. CLARK

Selection Committee: J. S. THOMSON (*Chairman*), D. A. MACGIBBON, A. G. BAILEY, G. E. BRITNELL, F. E. L. PRIESTLEY, and V. W. BLADEN

Programme and Editorial Committee: S. D. CLARK (*Chairman*), H. ALEXANDER, A. F. B. CLARK, D. G. CREIGHTON, V. W. BLADEN

Scholarship Committee: F. H. ANDERSON (*Chairman*), F. M. SALTER, W. KAYE LAMB

General Nominating Committee: C. P. STACEY, G. B. PHELAN

Lorne Pierce Medal Committee: President, Vice-President, and J. R. DANIELLS

Tyrrell Medal Committee: President, Vice-President, and C. B. SISSONS

The Report of Council was adopted.

The Section noted with deep regret the deaths of Dr. Percy Robinson, and Professor H. L. Stewart.

The Section recommended that the request of Dr. D. O. Evans and O. J. Todd to be placed on the retired list be granted.

It also recommended that the Society establish a committee to study the laws of copyright and to consider whether a brief be presented to the Royal Commission.

The Section asks permission to elect six Fellows in 1955.

It was moved by V. W. Bladen and seconded by F. M. Salter, that this report be adopted and that permission to elect six Fellows be granted.

REPORT OF SECTION III

The Section held two business meetings and a total of ten scientific sessions at which approximately 80 of the 109 papers on the programme were presented.

The Section noted with deep regret the deaths of two of its Fellows: Dr. C. C. Coffin and Dr. Steward Basterfield.

Forty-four Fellows and six visitors signed the attendance book. About 150 attended the general session on Monday afternoon.

The following officers and committee members were elected:

President: Dr. R. M. PETRIE

Vice-President: Dr. W. H. WATSON

Secretary: Dr. A. D. MISENER

Additional member of Council: Dr. P. E. GAGNON

Tory Medal Committee: J. S. FOSTER (*Chairman*), H. S. M. COXETER, G. HERZBERG, G. M. SHRUM, T. THORVALDSON

Selection Committee: W. L. G. WILLIAMS (*Chairman*), LÉO MARION, D. J. LE ROY, and the Officers of the Section

Editorial Committee: D. A. KEYS, R. L. JEFFERY, T. THORVALDSON

Editorial Board for the Canadian Journals of Research: G. H. VOLKOFF, T. THORVALDSON

General Nominating Committee: The President and Vice-President of the Section

Committee on Royal Society Scholarships: D. J. LE ROY (*Chairman*), C. S. BEALS, J. S. FOSTER, R. L. JEFFERY

Section III representative on the Canadian Institute of Chemistry

Medal Committee: Dr. E. W. R. STEACIE

Section III representative on the Canadian National Committee of the International Union of Pure and Applied Chemistry: Dr. H. G. THODE

The Section formally accepted the report of Council but the Section notes with regret the statement in Section VIII of the Report of Council that the organization committee has not completed a revision of the By-laws of the Society. The Section recommends that the revision of the By-laws be carried out as rapidly as possible.

At the business meetings of the Section considerable discussion took place on the relative numbers of new Fellows elected each year in the various Sections.

The Section decided to request that it be allowed to elect twelve new Fellows in the coming year, 1955, even if such action requires a suspension of the By-laws.

At the request of Council the Section considered the proposal of some recognition of the 75th anniversary of the Society. The Section is in favour of some suitable recognition of the 75th anniversary and the Section will co-operate with other Sections in carrying out a suitable plan. The Section appointed Dr. W. H. Watson to represent it on any committee that may be formed in this regard.

Note:

This report was accepted at the general meeting of the Society on June 2, 1954. Dr. Thode moved that Section III be allowed to elect twelve new Fellows in 1955. Section V amended the motion to allow Section V also to elect twelve new Fellows. There was considerable discussion and finally a vote was taken. The motion was defeated.

A motion was passed allowing Section III to elect the usual six new Fellows in 1955.

REPORT OF SECTION IV

Section IV held four sessions, attended by more than thirty-five Fellows and guests. Four new Fellows, W. F. James, S. G. Robinson, W. A. Roliff, and J. Satterly were elected and presented at the General Meeting. N. Campbell who was elected in 1953 but was absent at that time was also presented.

The following officers and representatives were elected for the Section:

President: J. B. MAWDSLEY

Vice-President: J. E. HAWLEY

Secretary: H. S. BOSTOCK

Additional Member of Council: T. H. CLARK

Representatives of Section IV to the General Nominating Committee:

E. S. MOORE (continuing for one year), I. W. JONES (continuing for two years)

Editorial Committee: For the Transactions of 1954 the Chairman is G. S. HUME and the members of his Committee are chosen from among the other Fellows of the Section at Ottawa. For the Transactions of 1955 the Chairman will be J. E. THOMSON and the members of his Committee will be chosen from among the other Fellows in Toronto.

Committee on Nominations to Section IV: J. F. HENDERSON (*Chairman*), A. W. JOLIFFE, H. V. WARREN, J. E. GILL, F. H. EDMUNDS, G. S. MACKENZIE

Willet G. Miller Medal Committee: (This Committee will decide the award for 1955 and stand until then): J. E. GILL (*Chairman*), R. T. D. WICKENDEN, J. E. HAWLEY, A. E. WILSON, L. S. RUSSELL

Representatives from Section IV for the Royal Society of Canada Committee for the selection of awards for scholarships and fellowships: H. C. COOKE (*Chairman*), E. S. MOORE, H. J. FRASER

Section IV has appointed a Committee to guide the researches on the determination of the ages of rocks and minerals. The Chairman will be J. B. Mawdsley, and the other members of the Committee will include Fellows from Section IV and from other Sections and nominees from outside the Society.

Section IV has appointed a Planning and Programme Committee: J. T. WILSON (*Chairman*), H. C. GUNNING, G. M. BROWNELL, and The President of the Section. In this Committee the Chairman is to continue for three years and one of the other members is to be replaced each year.

Section IV proposes to elect and recommends to the Society four new Fellows for 1955.

The request by Dr. C. E. Cairnes to be placed on the retired list is accepted with regret and recommended to Council.

It is recommended that G. Taylor who has ceased to pay his dues for some years and has not asked to be placed on the retired list be dropped from the Fellowship of the Society. He is no longer living in Canada.

It was moved by G. M. Brownell, seconded by M. Y. Williams, that this report be accepted.

REPORT OF SECTION V

Forty-two Fellows and a large number of guests were in attendance, and fifty-one papers were presented.

The Section held two business meetings. It met as a whole on Monday afternoon for the Presidential Address by Dr. R. D. Gibbs who spoke on "Comparative Chemistry and Phylogeny of Flowering Plants"; for the Flavelle Medal Address by Dr. D. A. Scott on "Some Aspects of Protein Chemistry"; for a provocative paper by Dr. Rowan on "Intellect and Human Survival"; and for two papers of general interest.

On Tuesday morning the whole Section met for a symposium of four invitation papers on "The Biochemical and Biophysical Approach to the Solution of Biological Problems," and in the afternoon considered papers on biochemistry, bacteriology, and plant pathology. The Section then divided for the meetings on Wednesday and met in two subsections on Botany and Zoology, and Physiology and Medicine.

Six Fellows were elected this year and the Section requests suspension of the By-laws and permission to elect twelve Fellows in the session 1954-1955. It is pointed out that last year the Section requested permission to elect only six Fellows with considerable reluctance as the files of the Section were loaded with names of a large number of nominations, many of these of persons of outstanding eminence. However, since the Committee of Council on organization had the whole question under study, it was then felt that further action as to numbers of Fellows elected should await completion of the survey and presentation of the report to Council. However, there has been acceleration in the accumulation of worthy nominations and the request for permission to elect twelve Fellows in the

coming year is deemed an essential step in the effort to meet an increasingly serious situation.

The Section accepted the Report of Council, took notice of the transfer of Drs. L. E. Kirk and A. B. Macallum to the retired list, and noted with regret the deaths of Dr. C. L. Huskins from the active list and that of Baron Geddes from the retired list.

On the request of Council a committee of G. B. Reed (Chairman), E. G. D. Murray, and W. H. Cook was appointed to consider regulations for the use of the Harrison bequest.

The Section wishes to congratulate the Honorary Treasurer of the Society on his financial report.

The Section agreed to the following resolution concerning the Flavelle Medal: "It is recommended that the regulations governing the award of the Flavelle Medal be amended to provide that the circular letter be sent out to Fellows of Section V not later than October 15th, and that replies, in order to receive consideration, reach the Chairman of the Selection Committee not later than November 30th." It was pointed out that the honour involved in the Flavelle Medal is more important than the metal in which it is cast, and the Section recommends that the medal be available for annual award.

The Section felt that there should be better integration of the programmes of the various sections to permit joint sessions on general topics of mutual interest. Council was requested to give consideration to this matter and, if acceptable, establish a suitable mechanism to this end.

It was the unanimous opinion of Section V that there should be some special celebration of the 75th anniversary of the Society, but it was felt that the details could be left to Council.

The following officers and committee members were elected for the 1954-1955 session:

President: E. G. D. MURRAY

Vice-President: G. MAHEUX

Secretary: N. H. GRACE

Additional Member of Council: R. D. GIBBS

Editorial Committee: E. HORNE CRAIGIE (*Chairman*), H. B. SIFTON, L. C. SIMARD

Committee for Flavelle Medal: To retire in 1955, J. R. DYMOND (*Chairman*), R. L. NOBLE, R. POMERLEAU; to retire in 1956, W. G. PENFIELD, D. L. BAILEY, W. H. COOK

General Nominating Committee: G. B. REED, R. D. GIBBS

Selection Committee: To retire in 1955, G. MAHEUX (*Chairman*), E. G. D. MURRAY; To retire in 1956, A. G. MCCALLA, A. G. LOCHHEAD; To retire in 1957, F. R. HAYES, G. KROTKOV and the Secretary, N. H. GRACE

Scholarship Committee: D. L. THOMSON (*Chairman*), J. R. DYMOND, W. LEACH, BLYTHE EAGLES

Programme Committee: J. R. DYMOND (*Chairman*), F. E. J. FRY,
J. ROUSSEAU

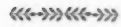
Representatives on Editorial Board, Canadian Journals of Research:
D. L. BAILEY, E. HORNE CRAIGIE

It was moved by N. H. Grace, seconded by R. D. Gibbs that this report be accepted.

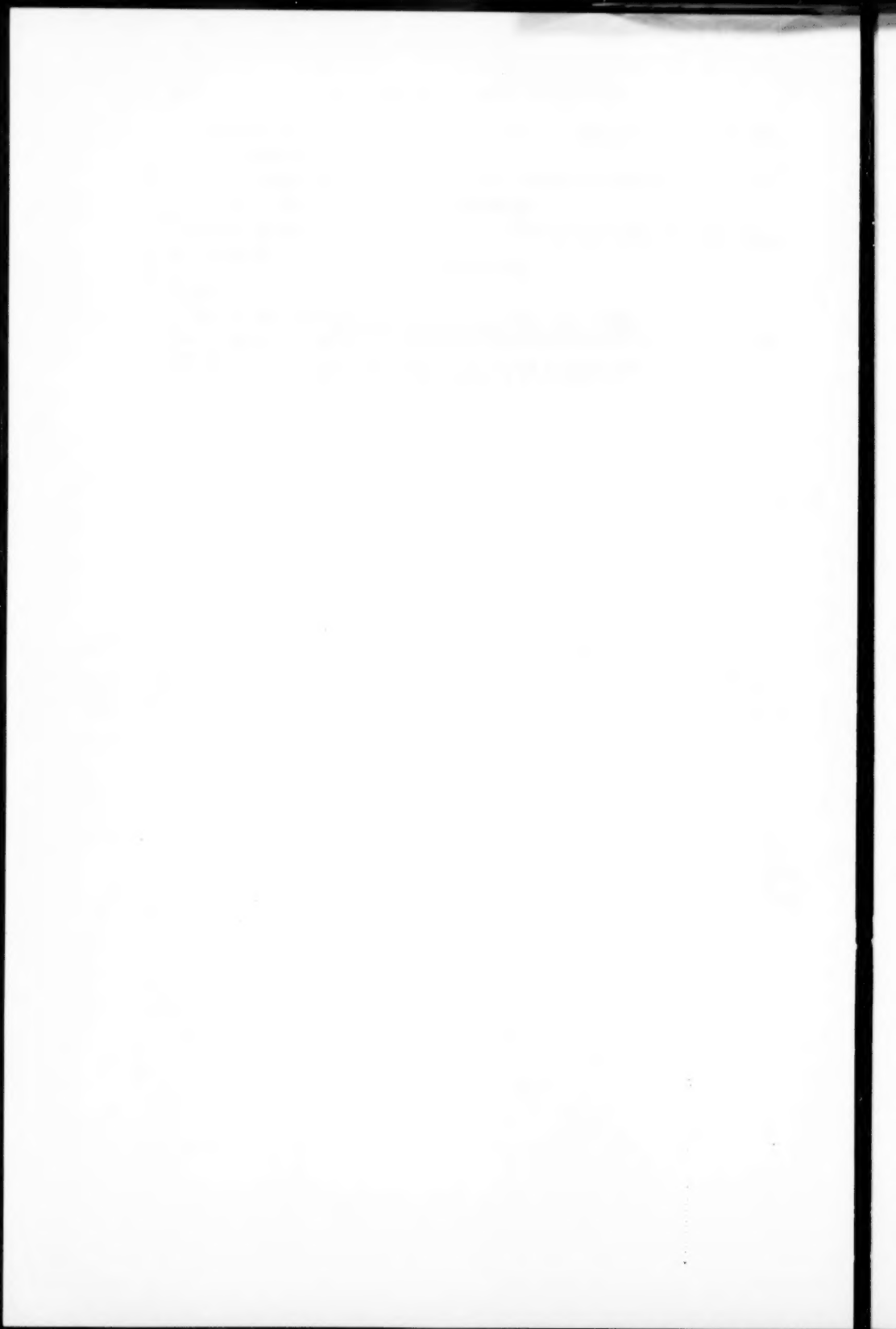
Note:

The section requested permission to elect six Fellows next year as a motion sponsored by Sections III and V to suspend the by-law for one year was lost.

APPENDIX A



DISCOURS PRÉSIDENTIEL
PRESIDENTIAL ADDRESS



PROCÈS-VERBAUX DE LA SOCIÉTÉ ROYALE DU CANADA

TROISIÈME SÉRIE : VOLUME XLVIII : JUIN 1954



DISCOURS PRÉSIDENTIEL

PRESIDENTIAL ADDRESS

Regards sur la Société Royale du Canada

A Glance at the Royal Society of Canada

JEAN BRUCHÉSI, M.S.R.C.

AL'AMI qui lui demandait un jour pourquoi il aspirait à l'habit vert dont sont revêtus les membres de l'Académie française, le maréchal Juin, qui n'a sans doute pas cessé de faire parler de lui, répondit en ces termes : « C'est le seul uniforme dont ne vous dépouille pas l'âge de la retraite. »

Les membres de la Société Royale du Canada n'ont pas, comme ceux de l'Académie française, le privilège d'être accueillis au milieu de leurs confrères par le roulement des tambours, ni celui de porter bicorne, épée et habit brodé qui sont, pour les Académiciens français, les signes sensibles de leur immortalité pour la vie. La réception officielle dans les rangs de notre Société, qui marque le début de chaque congrès annuel, est on ne peut plus dénuée d'apparat. Une sèche énumération de titres, une poignée de main, la remise d'un diplôme, une signature dans le livre d'or... Et l'on est membre de la Société Royale du Canada aussi longtemps qu'on paie sa cotisation. La remise des prix dans une modeste école de campagne de la Province de Québec et, à plus forte raison, la proclamation des diplômés de nos universités, à la fin de l'année académique, n'ont pas de mal à être plus impressionnantes.

Les choses étant ce qu'elles sont, il va de soi que l'élection du président de la Société Royale ne donne pas lieu à plus d'éclat que celle du président d'une association ou fraternité quelconque. Le seul moment d'excitation — et encore ! — est celui qui précède le choix du vice-président. Une fois élu à cette fonction peu encombrante, dont l'exercice correspond à une sorte de noviciat, il suffit de patienter un an. Le délai réglementaire expiré, le vice-président devient automatiquement président. Puis, après un autre délai de douze mois, il cesse automatiquement de l'être, non sans s'être acquitté d'un dernier devoir qui est le discours d'adieu, mais qui peut être aussi un discours-programme... à l'adresse de son successeur.

Même si j'ai l'air de blaguer un peu — ce dont je devrais sans doute me garder — je ne tiens nullement à donner l'impression que je n'apprécie point à sa réelle valeur la distinction d'être devenu, en juin dernier, le soixante-douzième président de la Société Royale. « Une décoration, a-t-on

dit, ne fait plaisir que si on ne la mérite pas tout à fait. Un bonheur n'est parfait que si on l'a un peu volé. » La présidence de la Société Royale ressemble beaucoup à une décoration. Ceux qui m'ont fait l'honneur de m'y appeler m'ont ainsi témoigné infiniment d'estime et de confiance. Je ne suis pas certain d'avoir mérité l'honneur, mais je voudrais être sûr, au moment de céder ma place à un plus digne, de n'avoir ni perdu votre estime ni trompé votre confiance. Et c'est dans cet esprit que je vous invite à jeter avec moi quelques regards sur la Société Royale du Canada. Ce sera, du reste, pour vous comme pour moi, l'occasion de rappeler les motifs qui ont inspiré ses fondateurs et de nous demander si nous sommes les gardiens fidèles de la tradition établie en 1882. Sans doute notre monde inquiet, tiraillé comme il le fut rarement entre les forces du bien et du mal, ne se laisse guère séduire par la tradition; il se glorifie au contraire, semble-t-il, de refuser la sagesse, avec la tradition, sans voir qu'il refuse du même coup la durée. Or il n'y a pas de culture véritable sans la reconnaissance que la sagesse précisément commande à tout peuple ou à tout groupement d'hommes d'entretenir s'ils ne veulent pas disparaître. Et la reconnaissance, prise dans son sens propre, n'est pas d'abord l'expression d'un sentiment; elle est avant tout un acte de l'esprit qui donne à la tradition sa valeur réelle en même temps qu'il préserve le souci de la continuité.

Any man longs to be understood, whether he be a scientist, a man of letters, or an artist, and even if he is not a scholar or an "érudit" as one would say in French. Although he may accept failure to be understood for the moment, yet he must feel that at a certain time or other in his life, he will be heard by a few of his contemporaries at least. "Vae Soli!" proclaims Ecclesiastes: "Woe to the solitary man." Nobody likes to have the impression that he works in a desert; and what would become of creative or research work if those engaged therein were not stimulated by the hope of imparting to others, the results of their discoveries and dreams?

This hope, more or less pronounced according to the creative force of each individual, and the type of work to be carried out, would seem to have been the impetus which has caused scientists, literary men, or artists to group together, were it only for the purpose of having, according to the words of the French novelist, Georges Duhamel, "a haven or protection against the extraordinary ungratefulness of the unfurling generations." Thus were founded the first academies, literary or scientific societies, such as the craftsmen's corporations, which were famous in the Middle Ages. Though the corporations were not unconcerned as to the quality of the work to be undertaken, they also had a purpose in mind, which eventually became their sole object: that which is called today, the safeguarding of professional interests. One easily grasps the fundamental difference which existed of yore between l'Académie française, founded in 1645, the French Academy of Science, founded in 1666, or the Royal Society, of Great Britain, founded around 1662, and the Goldsmiths' Corporation, in Paris, or the Drapers' Guild, in London. Today, corporations and guilds

are replaced by syndicates, trade unions, and professional associations. As for academies and literary, artistic, or scientific societies, they are becoming more and more numerous, especially the scientific associations, owing to progress made in the field of specialization. Even though the main object of the majority is to contribute towards improving natural knowledge, very few are not first concerned with the moral or material interests of a definite profession or trade.

It is not my intention to trace back throughout the history of Canada the literary or scientific societies which have issued forth on our soil since the first years of colonization. I only wish to recall that, as early as 1607, at Port Royal, Champlain founded the "Ordre de Bon Temps," to beguile the weariness and solitude of his companions, and that Marc Lescarbot, the witty Parisian advocate, was the principal animator of our first Literary and . . . Gastronomic Society, which lasted but one winter and one spring. No one, during the whole of the French Régime, thought of reviving this Society or founding another. To tell the truth, it was only at the beginning of the last century that there appeared, very timidly at first, modest literary or scientific societies, two of which are still in existence: the "Quebec Literary and Historical Society" (1824) and the "Institut Canadien de Québec" (1848). Although research work is no longer carried out, they nevertheless continue their educational and cultural activities.

A hundred years ago, there was nothing to indicate that Canada, a century later, through the extent of her territory and the wealth of her natural resources, would become one of the greatest economic powers in the world. Industry then was still in its early stages, and those who took the trouble to make a closer study of the economic conditions of the British colonies in North America, found that their only chance of expanding was through agricultural production; they were hardly mistaken, for, prior to the conflict of 1914, Canada owed the bulk of its fortune to the export of cereals and the breeding of cattle. Nor was there any question of our country being known through the works of its literary men or scientists; for they were few and far between, even when the young Dominion included seven provinces.

In 1881, Canada had a Governor-General, the Marquis of Lorne, who was married to one of the daughters of Queen Victoria. He was a conscientious administrator and had a highly cultured mind. His character and his tastes had inclined him towards historical studies just as they caused him to seek the companionship of literary men, or the learned. He was interested in the political evolution and economic progress of the Dominion, as much as in the advancement of letters, arts, and science, and in the intellectual development of Canadians. He firmly believed, and with reason, that one of the most effective ways of succeeding in both ventures was to establish a society whose object would be "to encourage studies and investigations in literature and science," which society would consist of "a certain number of members who had made their mark by their writings,

whether these be of imagination or the study of nature."¹ The Governor-General imparted his idea to a few English-speaking and French-speaking Canadians who had already gained fame through their work. Those whom he had convened at Rideau Hall for their advice on what he termed "a very important matter," finally got together in Montreal, at his request, on December 29 and 30, 1881. Five months later, on May 25, 26, and 27, 1882, the first formal sittings of the Royal Society of Canada were held at Ottawa, in the Senate, or in the Railway Committee Room, under the chairmanship of the Marquis of Lorne. It had been agreed that the new Society would include two departments, representing Literature and Science respectively, divided into four sections, each section to include twenty members. As was expected, the first members of the Royal Society were appointed by the Governor-General, who was assisted by the geologist, John William Dawson, and the essayist Faucher de Saint-Maurice, among others, in making his choice. The only ones who criticized the choice of members were, naturally, those who believed that they had been unjustly set aside. In so far as public opinion was concerned with the birth of the Royal Society, the event did not give rise to any controversy, nor did it cause any violent agitation. In fact, the sixty Canadians or so who proceeded to Ottawa at that time were, in reality, representatives of our small literary and scientific world. These Canadians also illustrated the bilingual and bicultural element of our country, whilst proclaiming by their various local origins, the importance of the geographical factor in a society truly Canadian.

Composed, as was mentioned before, of four sections to which a fifth was to be added shortly, the Royal Society seemed destined to rank both with the Academy and the Literary or Scientific Society. Its founders—the Marquis of Lorne and the fifteen Canadians whom he consulted—had agreed, however, to adopt the Leibnitzian form of organization, which favoured the union of sciences and humanities, rather than that of the Renaissance, which maintained a boundary between literature and science. This implied that the new Society, instead of being formed to include several autonomous academies as in France—such academies being grouped together under the name of the "Institut de France"—would be composed of sections, subject to general by-laws which, moreover, would not exclude special by-laws, and that it would be patterned on the Royal Society of London, not on the National Academy of Sciences in the United States.

The idea of bringing literary and scientific men together in a community of duties towards the same society, was a happy one indeed; so also was that of procuring for both parties the opportunity of meeting at least once a year. The division into Sections did not imply that there would be a wall between English-speaking or French-speaking literary men and humanists, or between the latter and scientists, or between the scientists themselves. "The choice was wise," as Dr. Playfair McMurrich, forty-second President

¹*Transactions of the Royal Society of Canada, First Series, vol. I (1882-3).*

of our Society, then asserted, "if the association of the humanities and the sciences leads to interaction; otherwise it is a confession and a source of weakness."² Yes, indeed, the Royal Society would run the risk of failing in at least one of the purposes of its formation: the co-ordination of efforts with the object of furthering, for the common weal, the development of letters and science in a young country that perforce had given little attention to the subject. As the Marquis of Lorne stated in his speech of welcome to the original members of the Society: "The meeting of our eminent men will contribute to unite on a common ground those best able to express the thoughts and illustrate the history of the time. It will serve to strengthen emulation among us, for the discussion made in other lands must breed the desire to push the intellectual development of our own."³

In uttering these words, the Governor-General of that time was pointing out to the Royal Society its principal *raison d'être*, as well as expressing the feelings which prompted him to take the necessary steps for its establishment. We know for a fact that the Marquis of Lorne was even more far-sighted, having gone so far as to entrust the Royal Society with the mission of making Canada better known to Canadians, thanks, no doubt, to the good work of its members, but also thanks to the annual meetings which would be held in the various cities of the vast Dominion. The Royal Society would be a sort of itinerant academy. Moreover, it seemed quite possible to this nobleman and a few of his most intimate collaborators, that by bringing English-Canadians and French-Canadians together under the banner of intellectual culture, the Royal Society would hasten the day when there would be a truly Canadian nation based not only on equal duties and sacrifices, but also on equal rights and privileges. We shall be wondering before long, if the Royal Society is really concerned with achieving this purpose, or at least to what degree, and by what means it has drawn nearer to this splendid ideal. It would be a lot easier to ascertain, without entering into too many details, whether or not it has fulfilled the four special objects provided for in its Act of Incorporation, and which Professor Playfair McMurrich, the eminent zoologist of Toronto, recollected in 1923.

Le premier de ces buts consistait et consiste toujours « to encourage studies and investigation in literature and science ». Il ne fait pas de doute que les membres de la Société Royale, même s'ils n'ont pas été, loin de là, les seuls à le faire, ont grandement contribué, au Canada du moins, à la connaissance et au rayonnement des lettres ou des sciences. Qui peut nier qu'ils aient été, dans une très large mesure, encouragés par la Société à poursuivre leurs études et leurs recherches, soit que l'espoir d'y être admis les ait vigoureusement stimulés, soit que leur élection, au lieu d'avoir l'effet d'un soporifique, comme cela arrive trop souvent, ait été pour eux un motif de travailler davantage ? Du reste, s'il y en a — et il y en a sûrement — qui doutent des services rendus par la Société Royale aux études

²*Ibid.*, Third Series, vol. XVII (1923).

³*Ibid.*, First Series, vol. I (1882-3).

et à la recherche, en littérature comme en science, qu'ils se donnent donc la peine de parcourir l'imposante collection de ses Mémoires. Car la Société avait précisément comme deuxième objet pratique la publication des « transactions, annually or semi-annually, containing the minutes of proceedings at meetings, records of the work performed, original papers and memoirs of merit, and such other documents as may be deemed worthy of publication ». Tout en reconnaissant que la Société Royale n'a sans doute pas fait paraître tous les travaux et mémoires de valeur, ni tous autres documents dignes d'être publiés, faute d'en avoir toujours les moyens matériels, même si, d'autre part, tout ce qui a paru dans les Rapports n'est pas de première qualité, il serait injuste d'en imputer le blâme à elle seule. En tout cas, si certains peuvent lui reprocher avec raison de n'avoir pas été assez généreuse pour aider à l'impression de travaux et mémoires de qualité, il y a trente ou quarante ans, à une époque où les facilités de publication étaient peu nombreuses, où les lecteurs de mémoires techniques et scientifiques étaient clairsemés, le reproche ne vaut plus autant de nos jours. Et qui dira dans quelle mesure la Société Royale a vraiment coopéré à l'établissement d'organismes comme le Conseil National des Recherches, le Conseil des Recherches en sciences sociales ou le Conseil des Recherches en humanités, grâce auxquels un plus grand nombre de spécialistes peuvent aujourd'hui faire connaître leurs travaux ?

La publication d'études et mémoires n'était du reste pas la seule manière dont la Société Royale entendait encourager la recherche scientifique ou la production littéraire. Il y a soixante-douze ans, elle s'engageait — et c'est le troisième but que mentionne son acte de naissance — « to offer prizes for valuable papers on subjects relative to Canada and to aid researches already begun and carried so far as to render their ultimate value probable ». Ici, plus encore qu'au chapitre des publications, il faut admettre que notre Société n'a que très partiellement répondu à ses promesses. La raison en est bien simple, du moins la principale raison qui a été et qui demeure l'insuffisance des ressources. De fait, ce n'est qu'à compter de 1925, soit quarante-trois ans après sa fondation, que la Société Royale a pu offrir des prix aux hommes de lettres et aux hommes de science dont elle voulait couronner l'œuvre ou reconnaître les mérites. C'est alors seulement, grâce à la générosité de quelques-uns de ses membres, qu'elle pût attribuer — et chaque année depuis — des médailles qui portent les noms des donateurs, mais dont le coût dépasse aujourd'hui sensiblement les intérêts de chaque fondation. Ces médailles sont au nombre de six, la plus récente, la Médaille Chauveau — ainsi appelée en souvenir du premier président général canadien-français — étant payée entièrement à même la subvention généreuse que le gouvernement de la Province de Québec verse chaque année à la Section I. Et, comme pour les médailles, c'est sur les autres que la Société Royale a dû compter jusqu'ici pour pouvoir distribuer des bourses d'études ou de recherche: la « Carnegie Foundation » ou quelques gouvernements provinciaux.

A peu près incapable, bien que subventionnée par le gouvernement fédéral, de récompenser pour la peine la production, littéraire ou scientifique digne de l'être, la Société Royale n'était guère mieux placée, financièrement parlant, pour atteindre son quatrième objectif, c'est-à-dire « to assist in the collection of specimens with a view to the formation of a Canadian Museum or Archives, ethnology, archaeology and natural history ». Elle n'en entreprit pas moins, dès les premières années de son existence, de recueillir des spécimens illustrant la zoologie, la botanique, la géologie et l'ethnologie du Canada. Ces efforts, si modestes et sporadiques qu'ils aient été, ne furent cependant pas étrangers à la fondation du premier Musée canadien. Et si, plus tard, la Société Royale, comme telle, n'a pas eu de part directe à l'établissement de l'actuel Musée National et à l'organisation des Archives publiques, ces institutions relativement jeunes, dont nous sommes aujourd'hui fiers à juste titre, doivent le meilleur d'elles-mêmes à des membres de la Société, disparus ou vivants, que celle-ci s'est honorée d'accueillir, d'encourager, de soutenir, et qui se sont honorés en la servant.

Ce bref rappel des buts assignés à la Société Royale n'apprendra sans doute rien au plus grand nombre d'entre vous. Je ne suis certainement pas le premier et ne serai probablement pas le dernier à traiter ce sujet. Mais, pour reprendre les propres paroles prononcées en des circonstances analogues par monsieur H.-M. Tory : « It seems to me wise and in the interest of the society that we should bring under review occasionally the fundamental ideals for which we stand, in order that a continuity of purpose may be maintained⁴. » Précisément, nous sommes quelques-uns, je dirai même plusieurs, comme j'ai pu m'en rendre compte depuis quatre ou cinq ans, et plus particulièrement au cours des derniers mois, à nous demander si la Société Royale est demeurée tout à fait fidèle à l'idéal de ses fondateurs, si la forme présente de son organisation est convenable et profitable, si l'esprit qui l'anime est vraiment celui que commandent les changements rapides et radicaux dont nous sommes les témoins et les acteurs, au Canada comme dans le reste du monde. Littérateurs ou scientifiques, et fiers d'appartenir à la Société Royale, nous avons sans doute le désir de promouvoir le bien commun en travaillant « co-operatively in proper balance », comme le président Tory le faisait remarquer en 1940. Mais, à cette dernière date déjà, en face des complications que l'emploi de la science apporte au monde moderne, des effets de la révolution industrielle et sociale sur la vie économique et politique des peuples, le même personnage n'hésitait pas à proclamer : « While we are co-operating in form we are really not doing it actually and effectively⁵. »

Far be it from me to presume that the Royal Society, even in its present status, is not answering a definite need. On the contrary, it is more than ever a great necessity. Moreover, should we not bear in mind that, to be successful, a Society like ours, based on collective intellectual effort, « calls for generosity in interpreting the work of those whose efforts lie outside

⁴*Ibid.*, Third Series, vol. XXXIV (1940).

⁵*Ibid.*

of the particular field in which we may be personally engaged »⁶, to quote once more Dr. Tory. This is indisputable in the literary, scientific, social or economic fields, between authors and those engaged in research work, who are subjected to distinct disciplines. But it should be all the more so between fellow-countrymen, in the field of human relations. For this reason, we should endeavour to find out if the Royal Society is at present accomplishing that which we have a right to expect of it, that is not only an improvement of natural knowledge in order to further the mental culture of our country, but also, that Canada may benefit from the advantages derived from both our cultures, a more thorough mutual knowledge and understanding of the two ethnic groups which form the bulk of the Canadian nation.

Seventy-two years ago, it might have seemed rash to propose grouping into a learned society, with the hope that it would give tone to the cultural life of our young nation, sixty or eighty Canadians truly superior through the extent of their knowledge and the quality of their work, both in literature and in science. John William Dawson—later Sir William Dawson—was the first to show signs of astonishment in his presidential address, "that so many names could have been proposed for membership." Moreover, he did not hesitate to acknowledge that in science or in literature, in arts or education, one would look around in vain "for anything that is fully ripe." And he added, "Our men of science are so few and our country so extensive that it is difficult to find in any one place or within reasonable distance of each other, half a dozen active workers in science."⁷ And yet, the problem had already arisen as to whether limitations should be placed on the membership of the Royal Society. Without giving an opinion on the very principle of the question, the Marquis of Lorne intended that "whatever number may hereafter be elected to this Society, it is to be desired that no man be upon its lists who has not, by some original and complete work, justified his selection." And again, President Dawson, convinced that "it would be a mistake to suppose that this Society should include all our literary and scientific men, or even all those of some local standing," estimated that the only ones worthy of being chosen were "representative men who have themselves done original work of at least Canadian celebrity." Otherwise, the Royal Society would incur the risk of becoming "a great popular assemblage whose members would be characterized rather by mere receptivity than by productiveness."⁸

No doubt could exist in our minds as to the intentions of the founders of a Society "exclusive in its membership but inclusive in that it offers its benefits to all." Setting aside the belief of those who claim that "a society so small in its membership" would "prove too select and exclusive for such a country as" Canada, President Dawson cited as an example not only Great Britain and the European countries, where strict limitations were truly placed on learned Societies, but the National Academy of Sciences,

⁶*Ibid.*

⁷*Ibid.*, First Series, vol. I (1882-3).

⁸*Ibid.*

in the United States; original members in the American academy had been limited to fifty, and although the maximum was raised to one hundred many years later, this number had not yet been attained in 1882. It would have been preferable, therefore, in order not to lower the scientific prestige of Canada—not very great at the time, but sure to grow up with years—to prevent the Society from becoming a mere professional association.

Many of us, I am quite sure, have read the stern remarks which were directed to the Royal Society by Mr. John Brebner, holder of the Tyrrell Medal of 1950, in his pamphlet entitled *Scholarship for Canada* (1945). According to that distinguished gentleman, the annual meetings of our Society, at least up to 1944 or 1945, "have been rather drowsy gatherings of pleasant urbanity but little distinction, and the transactions slumber for the most part on library shelves." Undoubtedly, to quote Mr. Brebner, "Canadian artists and scholars . . . , Fellows of the Society, periodically attempt to vitalize it," but "they soon relapse into making their principal contributions to meetings of their own special societies . . . rather than accept free interment of them in the Transactions and hundred free off-prints from the Society." And he adds: "As the matter stands at present the magic letters F.R.S.C. exercise an allure which evokes enterprise, log-rolling, and the arts of patronage until they are attained, but thereafter they seem to give off an honorific, autumnal glow which is comfortable rather than stimulating."⁹ A little more, and our sympathetic critic would have borrowed the words of another critic directed to a parent society where "the members write obituaries of each other when they die, and it is a pity that they have so little to do." If Mr. Brebner were but one exception, we could pass this off with a mere shrug of the shoulders. But again recently, in a paper on "Cultural Evolution," presented at "Canada's Tomorrow" Conference in Quebec City, Miss Hilda Neatby, of the University of Saskatchewan, expressed herself in about the same terms as Mr. Brebner, deploring the fact that "the one intellectual society which embraces both languages and all disciplines should be distinguished by pleasantness and prestige rather than by those sharp and stimulating exchanges which serve to bring all special insights and experiences to bear on the whole of life."¹⁰

Without agreeing with Mr. Brebner that the annual meetings of the Royal Society were originally and primarily "designed to be a series of symposiums," or presuming moreover that the symposiums would be the only means qualified to impel the best Canadian minds to fertilize each other, there is no doubt that a new force, a change of methods, indeed a marked transformation of structure, would be worthy of serious consideration on our part, with a view to finding the most practical solution to the problem under the circumstances. This solution—or at least one, for there

⁹*Scholarship for Canada*, by John Bartlet Brebner (Ottawa: Canadian Social Science Research Council, 1945).

¹⁰*Canada's Tomorrow*, ed. G. P. Gilmour (Toronto: Macmillan, 1954), p. 213.

may be many—would consist perhaps in revising our conception of a society such as ours, from the membership angle.

At present, there are some 470 Canadians who are privileged to have their names followed by the "magic letters" F.R.S.C. A very impressive number, indeed. Nevertheless, several members of the Society would like a distribution of seats which would be in proportion to the number of members forming part of the different scientific disciplines. According to some, there would be too many geologists and not enough chemists or physicists. On the other hand, the literary men could claim that the proportion of scientists, taking into account the five sections, is too high, and those of the humanities or social sciences that the literary men have the lion's share. From a linguistic and cultural point of view, it would seem that the French-speaking element is not represented as it should be, especially in the three scientific sections, though the true value of a chemist or mathematician is not rated according to language or race.

At all events, the real problem seems to boil down to this: should the Royal Society continue being a sort of federation of professional groups, to which all those who have distinguished themselves through their work may be admitted, without limitations on the membership of each section, including the Society itself? Or else, should it be looked upon as an authentic Academy that would welcome the best from the good, in limited numbers, of course, an Academy whose activities would not consist only of an annual meeting, but which would carry on all year round, whose authority would be felt throughout the Canadian nation, first of all through the personal prestige of its members, and also through the importance that public bodies, cultural centres, and learned societies would attach to its advice, recommendations, and mediations? But this would mean, without mentioning sufficient financial support, a nucleus of men willing to give a substantial part of their time, if not all, in order to fulfil the main objects of this Society; it would mean, among other things, a president who would not be compelled to pass in and out of office like a meteor, but would remain long enough to ground and assert himself and to wield a marked, nay, a decisive influence. It would, moreover, entail membership limitations.

Has the Royal Society, following Mr. Brebner and others who think likewise, "succumbed to the nature of national academies"? Or, following Miss Neatby—whose opinion is shared by a great many—does it suffer "from the 'specialism' which diverts most scholarly energy to the specialized and professional societies and journals . . . [which] are increasing in numbers and activity"?¹¹ Undoubtedly there is a lot of truth in these two opinions, the consensus of which expresses, more and more, it seems to me, the idea people have to some extent everywhere, both in Canada and abroad, of the Royal Society. Besides, is it not our duty to wonder if the time is not ripe to cut down the Society's membership, as already sug-

¹¹*Ibid.*

gested by Mr. Brebner and many others, "to something comparable, in terms of Canada's population, to other countries' select circles of 'living immortals' "¹² It is up to us to try and find an answer in a spirit of co-operation, whereby common weal would prevail over private interests.

Meanwhile, could one be considered biased if one deplored the fact that the Royal Society is not more closely and directly linked with the cultural life of Canada, even though the awarding of Federal Government scholarships for research and postgraduate studies, which has been entrusted to the Society for the past three years, indicates unquestionable progress? Would one be guilty of malevolence if one pointed out, for instance, that the Royal Society not only takes little or no active part in manifestations which, each year, commemorate the anniversary of some great figure in the world of scholars and scientists, but hardly ever takes the initiative, as it should, in a celebration in honour of a man or an event which has marked out, in the field of culture, the history of our country? Would it be a case of superiority complex to expect that the title of Fellow of the Royal Society, as well as that of President, should call for more deference and consideration on the part of public powers and academic circles, and not only on the part of those who have already been honoured or hope to be? While we are on the subject, it will be long before I forget an experience I had while visiting Halifax in 1951, as lecturer on behalf of the Royal Society. I happened to be there at the time that the Curlers' Annual Bonspiel was on, and having been graciously invited to a reception given by the City in honour of the event, I was introduced to the President of the Bonspiel and to the Mayor as "a distinguished citizen from Quebec." Both said: "Welcome Sir. . . . So you are a curler?" I immediately replied that I had not the honour, and appreciated all the more the invitation extended to a member of the Royal Society. "The Royal Society," they both inquired, "but what is that?"

Devoted to the promotion of Letters and Science in Canada, the Royal Society cannot ignore the problem which the duality of language and culture presents in our country. At the beginning of this speech, I took the liberty of recalling that the founders of the Royal Society had anticipated that, by grouping English and French Canadians together in the same devotion to culture, the Society would be a helpful factor in bringing about their better mutual understanding and would therefore contribute to the building of a Canadian nation, without, of course, the unnecessary assimilation of one group by the other. It cannot be denied that real progress has been made, especially during the latter years, as far as Canadian unity is concerned, particularly among those who are in the habit of being called "intellectuals." The Royal Society cannot claim full credit in this happy issue, but it helped to some extent, owing to the broad-mindedness which prevails among its members. This does not imply that everything is well and truly done—on the contrary—and that our Society reflects the

¹²*Scholarship for Canada.*

image of a bilingual and bicultural Canada, even if it is certain that the majority of Canadians do not accept the existence in fact, let alone by right, of this kind of Canada.

Some will say, not without a semblance of truth, that if the Royal Society has not accomplished all that it should have in this respect, the cause can be found in this division of literary men, sociologists, economists and humanists into two separate sections. Such a division, however, could have seemed plausible seventy-two years ago, owing to the fact that few of the people called upon to sit in either of these sections were bilingual. It is doubtful whether the situation in 1954, though greatly improved, would, from a practical point of view, call for an amalgamation of both sections; for bilingualism is not practised both ways; unfortunately, it is too often a one-sided affair. Should one agree with the famous historian and orientalist, René Grousset, that "it is just as impossible to speak two languages correctly as it is to love two women," and that to be "a bilinguist is as bad as being a bigamist"? Certainly comparative perfection, in the heart of the Royal Society at least, would not be superfluous.

Therefore, what is happening in reality? It is a fact that French-speaking members of the scientific sections, if they wish to be understood—I do not mean by the totality or even the majority of their English-speaking colleagues, but by a fair proportion of them—hesitate, to say the least, to express themselves in their mother tongue. The members of the French-speaking section are not burdened with this problem nor have they this case of conscience. And, during the course of recent years, they have displayed certain initiatives which have, indeed, been conducive to their acquiring in the public eye a certain degree of fame, and have not harmed in any way the reputation of the Royal Society, even though, for various reasons, they did not prevent the founding of a rival association, "l'Académie Canadienne-française," the existence of which is more embarrassing than detrimental. But coming back to the problem mentioned previously—a problem that seems to be as difficult to solve as that of the deduction of provincial income tax in Quebec!—is it not unfortunate that Sections I and II awaited the year of the annual meeting of 1952, at Quebec, to decide, irrevocably we hope until something else turns up, to hold a joint meeting under the form of a symposium, at which each one expressed himself in the language of his choice, without even the thought of translating from French into English or vice versa?

On a dit du Canada qu'il était un réservoir d'idées civilisatrices, dans un monde tourmenté. Ces idées civilisatrices, nous les avons puisées dans le patrimoine européen, à deux sources principales : l'anglaise et la française qui, toutes les deux, à des degrés divers, doivent le meilleur d'elles-mêmes à la Grèce et à Rome. Nous y avons ajouté notre apport, avec le temps et sous l'influence plus ou moins prononcée du milieu physique, social et politique dans lequel nous avons grandi, sans oublier l'influence que le voisinage des Etats-Unis, pour le bien comme pour le mal, a pu

exercer sur nous. Deux cultures se sont ainsi développées au Canada, côte à côte, parfois même en opposition l'une à l'autre, trop souvent, en tout cas, dans l'ignorance l'une de l'autre. Elles ne se sont pas amalgamées, intégrées, fondues au point de ne former plus qu'une seule culture qui se réclamerait à la fois de la culture anglaise et de la culture française, ou qui risquerait d'être plutôt quelque chose de bâtard, d'informe. Et nombreux ceux qui croient que c'est mieux ainsi, car le Canada peut offrir au monde quelque chose d'original. Il trouverait même, au dire de personnes averties, une force particulière, un précieux élément de richesse dans cette diversité, mais à la condition qu'une telle richesse soit connue, comprise, utilisée. D'où la nécessité d'échanges plus fréquents et, sur le plan culturel, d'une action conjointe qui, au lieu de se produire occasionnellement, deviendra en quelque sorte une habitude. Notre culture canadienne, si tant est que nous en reconnaissons une, n'est pas franco-anglaise ou anglo-française : elle est française et elle est anglaise. Cette réalité de fait n'est sans doute pas encore admise par la majorité des Canadiens, mais rien n'empêche qu'elle le soit, non seulement en paroles, mais en actes, par la Société Royale qui, à son tour, cherchera à en convaincre la nation canadienne. Car il existe bien, sur le plan économique et politique, une nation canadienne. En 1867, Anglais et Français du Canada ont contracté non pas un mariage d'amour, mais un mariage de raison. Et rien ne prouve qu'un mariage de raison doive être nécessairement une faillite...

Moreover, must we not admit that it is in the field of culture, more than in any other, that a true and sincere unity between all Canadians could be most easily achieved? Is it only English culture or only French culture that is threatened by the dangers that are becoming more and more evident in our country? Utilitarianism, which so many educators dread, is not more prevalent in the Province of Quebec than in the other provinces. Both French and English cultures are running the risk of being seriously affected. Everyone agrees that it might be, in part at least, the result of Canada's growing industrialization, of an excess of machinery, or scientific progress which may enslave man to technology. Whatever the cause may be, it is essential to react with great strength, and a close co-operation between both cultures is one of the surest ways to success.

Canada no longer offers, at first sight at least, the spectacle of a nation fundamentally divided. Religious and linguistic controversies no longer give rise to bitter clashes, as was the case in the still recent past. Nevertheless, it is quite evident that it would take only a spark to set off an explosion. It would be a mistake to adopt the tactics of the ostrich, or to entertain the belief that, although there is an absence of street-fighting, all is well in the best of worlds between Canadians of different language and religion. Undoubtedly, there exists a *modus vivendi*, acquired by tacit agreement, but, as mentioned before, it is a *modus vivendi* from which there issues very little cordiality. Therefore, we have reason to expect more, and we are deserving of more, even though our relations from ocean

to ocean may never be fired with love, for it is in the interest of our country, if we desire our country to be truly great.

Serious dissension exists between Canadians. But, owing to the present status of our country and that of the world, could not understanding be deeper than misunderstanding? In adopting a policy which proved very useful at such and such a time in the history of several countries, could we not say that our divisions are but given names, and that our family name is "Canadian"? However, recognition of this family name is only possible on condition that all the children included in the family, from the eldest down, should be treated alike. This cannot be accomplished without the highest exercise of charity and tolerance and a voluntary acceptance of certain facts. Tolerance and charity in our opinions; fair play and liberalism, in the broadest sense of the word, as some of our English-speaking compatriots say. Whatever the expression we may retain, the attitude thereof must not be on one side only. Civilizations perish because of the betrayal of the élite; nations also. They live and grow first of all thanks to the loyalty and attitude of the élite. Either I am greatly mistaken, or the Royal Society is a gathering of men of the élite, whose role is to train and set ranks in formation, in order that the troops may march on. Such a gathering is more necessary in a democracy than in any other régime; so much so that more and more Canadians are becoming worried about the trend toward technical training, about the kind of education which the majority of our students receive, which teaches them how to earn a living, but not how to live.

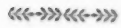
English-speaking or French-speaking Canadians, whether Catholics or not, once again, subjects are not lacking on which we may have differences of opinion. There are, however, basic principles on which we jointly agree, which we are becoming more and more aware of, naturally or by the strength of events; and these principles are more important than any others. It is in view of these principles and for them that we should join together, whether the problems be of a national or of an international nature. Together with the universities, to which we are all more or less linked, there could not be a more convenient meeting ground than the Royal Society. It is in the midst of this Society, if it does not betray its nature or its aim, that there should be found guidance and inspiration for all our learned societies; here a Canadian way of thought should emerge and become definite, to which we could all lay claim, without distinction of race, language, or creed; for an attitude so conceived and expressed would not require, from either party, the sacrificing of essential characteristics. This Canadian way of thinking would acknowledge the spiritual aspect of a bilateral alliance—or, if one prefers, an agreement, which led the way to a law—an alliance entered into between our two races, eighty-seven years ago, and would proclaim not only the right to linguistic and religious freedom, but also the right to practise both of them freely, everywhere in Canada.

L'Académie française est célèbre. Nombreux, surtout parmi les écrivains qu'elle a oublié ou refusé d'admettre chez elle, ceux qui l'ont attaquée ou tournée en ridicule, sans toutefois l'empêcher de poursuivre son œuvre. Il s'est, du reste, trouvé dans ses rangs d'authentiques « immortels » pour déplorer les imperfections dont elle n'est pas plus exempte que toute institution humaine. L'un de ses membres les plus connus, au cours du dernier demi-siècle, grand soldat, grand administrateur et grand écrivain, le maréchal Lyautey, rêvait, par exemple d'une autre Académie de grands seigneurs accueillant parmi eux des gens de talent et d'esprit, sous l'expresse condition que ces gens fussent tous, sans exception, des gens de qualité, tout au moins des gens de bonne compagnie, en un mot, des gentilhommes par la naissance ou par l'éducation¹³.

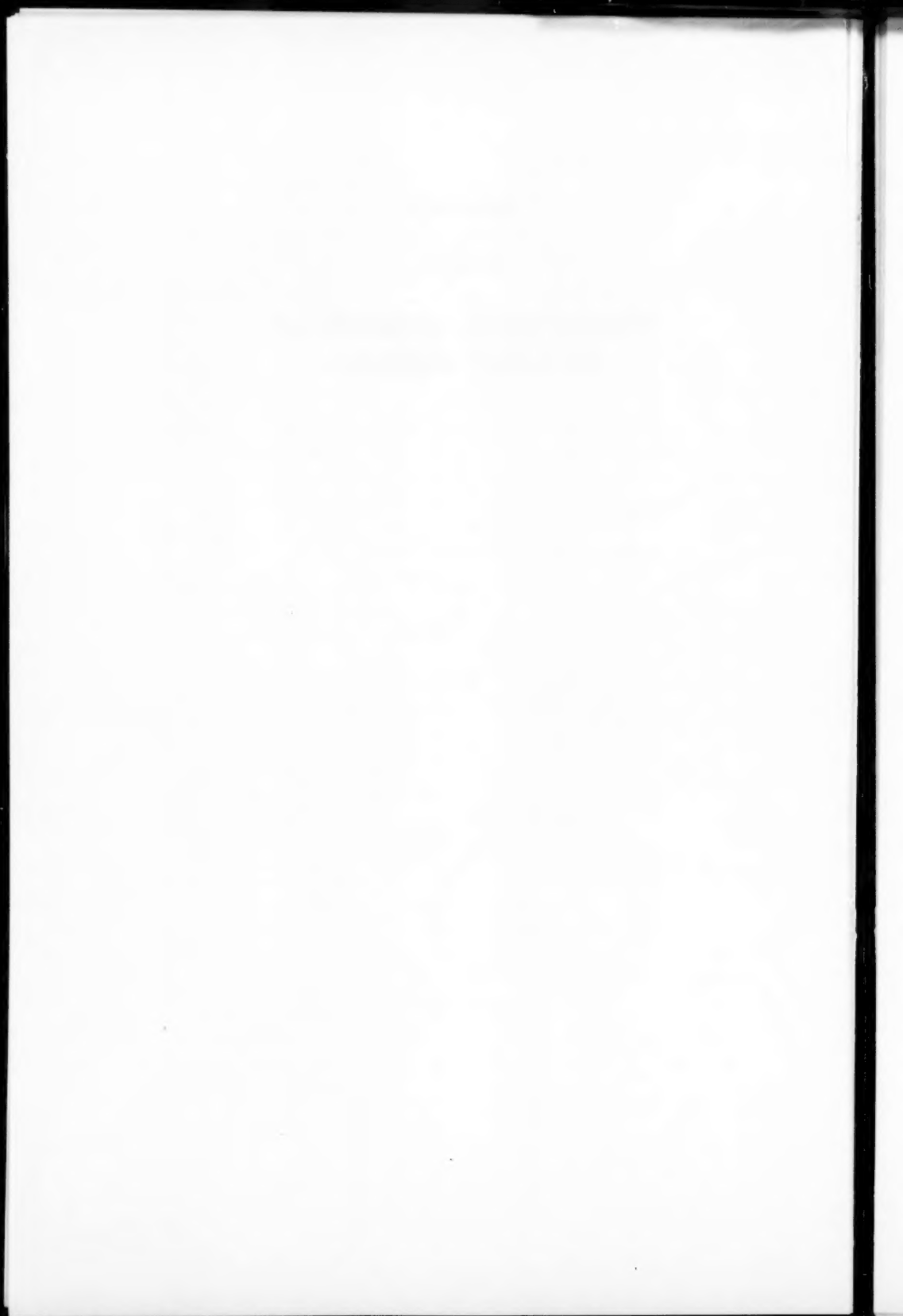
Il est trop tôt ou trop tard pour que nous puissions nous permettre de caresser un tel rêve. Mais l'avènement d'une Société Royale qui jouerait en notre pays le rôle dont j'ai tenté de décrire la nature et d'éclairer le sens, est-il une chimère ? C'est à nous, à moins que ce ne soit à nos arrière-neveux, de donner la réponse ; et de cette réponse dépend, en une très large mesure, l'avenir même du Canada.

¹³*Souvenirs*, par Claude Farrère (Paris: Fayard, 1953).

APPENDIX B



BIOGRAPHICAL SKETCHES OF
DECEASED MEMBERS



Steward Basterfield

1884-1954

STEWART BASTERFIELD was born at Halesowen in England on October 22, 1884. After attending school in England and the Universities of Birmingham and London (B.Sc., 1908) he came to Canada and was appointed Instructor in Chemistry at the University of Saskatchewan (1913). He subsequently took graduate work at the University of Chicago and obtained his Ph.D. in 1920. Dr. Basterfield was appointed Professor at the University of Saskatchewan in 1920 and held this position until 1940, when he was appointed Dean of Regina College. He filled this position with distinction until his retirement in 1950. Even after his retirement he continued, until the time of his death (February 17, 1954), to do some teaching at McMaster University. In 1933 he was elected a Fellow of the Royal Society of Canada.

Dr. Basterfield took a great interest in the professional aspects of Chemistry and was elected Fellow of the Canadian Institute of Chemistry in 1920. He served as Councillor (1928-1931) and as Vice-President (1929) and was engaged in a speaking tour for the Chemical Institute of Canada at the time of his last illness.

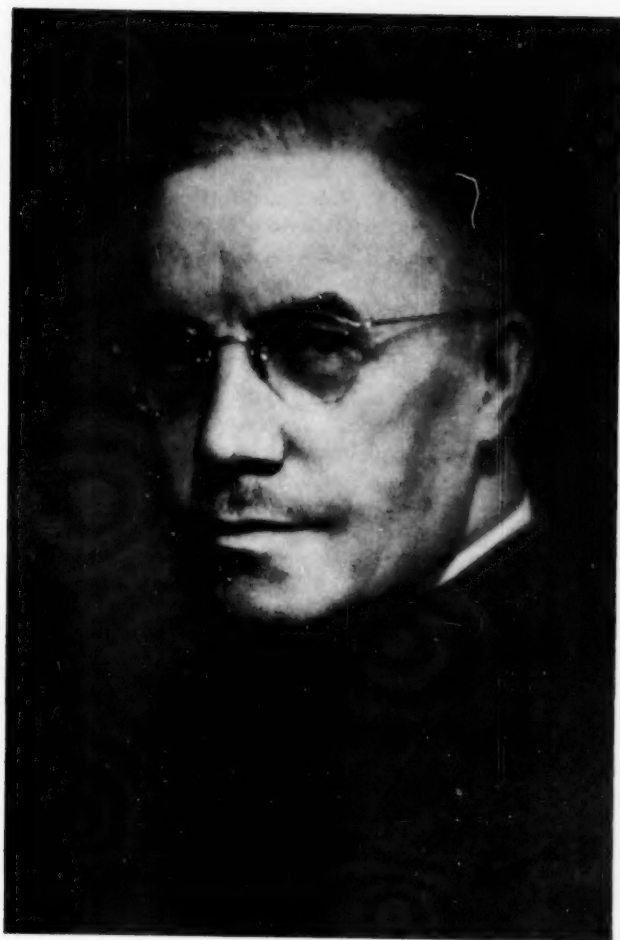
Dr. Basterfield was not only a well-trained organic chemist with an outstanding ability to inspire his students, but, what is more rare, he was a scientist with a deep interest in the history of science and in philosophy. These two aspects were revealed in his many publications in the field of organic sulphur compounds, in his articles on Newton and Leibnitz, and others on the place of science in a world view.

Many will remember the pleasant hours spent in his company, when discussions ranged far and wide in a world of expanding horizons. He felt that there was an urgent need for a new system of knowledge, a weaving together of the main strands of thought that have been spun by busy workers in so many intellectual mills. He felt that there should be an understanding of the world of men and things, that there should be moral and aesthetic insight, that there should be idealism and a sense of the high value of life itself.

He is survived by his widow, the former Margaret Cummings of Saskatoon, and by two daughters, Elizabeth Basterfield and Mrs. Joan Sherk.

T. THORVALDSON
J. W. T. SPINKS

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STEWARD BASTERFIELD



Carl Cowan Coffin

1903-1954

IN the death of Carl Cowan Coffin at Halifax on January 12, 1954, the Society lost one of the most brilliant of its chemists, and Dalhousie lost one who had done much to develop science in the Maritime Provinces. Carl Coffin was born in Tatamagouche, Nova Scotia, on March 14, 1903, the son of the Rev. Robert L. and Alice (Cowan) Coffin. He attended Prince of Wales College, and entered Dalhousie University with the first Sir William Young Entrance Scholarship. He obtained his B.A. with distinction in 1924, and after two years spent in the research laboratories of Shawinigan Chemicals Ltd., went on to McGill for graduate work.

At McGill he held National Research Council scholarships throughout his course, and took his Ph.D. in 1929 under the direction of Professor Otto Maass. The period at McGill was a particularly happy one. Like Maass, Coffin was primarily an experimentalist, and one of very great originality and ingenuity. He had a particular flair for doing things with high accuracy in the simplest possible way and with a minimum of equipment. Of all Maass' students the writer knows of no one who possessed to the same degree the experimental touch for which the school has always been famous.

After McGill, Coffin spent a year at Utrecht with Ernst Cohen on a travelling fellowship, and then returned to Dalhousie as a Lecturer, Assistant, and Associate Professor. In 1942 he was made head of the Chemistry Department, holding the original McLeod Chair of Chemistry for one year, and was then appointed to the newly established Harry Shirreff Chair of Chemical Research.

At Dalhousie, Coffin and his students carried out a great deal of work of great importance. A series of twelve papers on the kinetics of the decomposition of esters played an important part in the development of chemical kinetics, and in particular in the theory of unimolecular reactions. Other major fields of work produced investigations on "explosive" anti-mony, on the development of a new method of calorimetry, and a variety of papers on development of experimental methods. He built up over the years a notable school of physical chemistry at Dalhousie. His students were always his friends, and from him they obtained a training and an outlook which they never lost. Few university professors have turned out as many students who distinguished themselves in later life.

Coffin had a great influence on the development of Canadian chemistry, and in particular on the development of scientific research at Dalhousie. In recognition of his attainments he was elected a member of the Royal Society of Canada in 1935 at the unusually early age of 32.

During the war he played a considerable role in the chemical warfare programme. At the end of the war he became interested in radiochemistry and a start was made on a number of very interesting problems in this field. Unfortunately, as a result of a tragic accident in 1949 he largely lost his sight. In spite of this, however, he carried on his university duties, but of necessity his scientific work was greatly cut down. This accident and his untimely death undoubtedly prevented a further great development of chemical research at Dalhousie, and constituted a major loss to Canadian Chemistry.

In 1930 Coffin married Irene Lopatto. His home life was particularly happy, and his wife's sympathetic assistance alone made possible the continuation of his work in his later years. In addition to his wife he is survived by two daughters, Janet at home, and Natasha, a graduate student in Chemistry at McGill. Natasha is a quite exceptional student, having graduated from Dalhousie in 1953 with first-class honours in Chemistry, and the Governor-General's Gold Medal.

E. W. R. STEACIE



CARL COWAN COFFIN



Eugène Rodolphe Faribault

1860-1953

IN the death of Eugène Rodolphe Faribault, which occurred in an Ottawa hospital on July 24, 1953, Canada lost one of her great pioneer geologists, and the Society, one of its most senior members. Dr. Faribault was in his 93rd year, and had retired in 1933 from the Geological Survey of Canada, after fifty-one years with that organization.

Born at L'Assomption, Quebec, on November 4, 1860, he was the son of the late Dr. Charles T. Faribault and his wife, the former Caroline Leprohon. He was the great-grandson of Barthelmi Faribault, a royal notary of Paris, France, who came to Canada in 1852 as a secretary of the French Army under General Duquesne. The Faribault family was prominent in French affairs as far back as 1260.

Dr. Faribault was educated at Terrebonne College and Plateau Academy, later graduating with honours from L'Ecole Polytechnique in Montreal. Laval awarded him the C.E. degree in 1890, the B.A.Sc. degree in 1898, and the honorary degree of Doctor of Science in 1921.

He joined the Geological Survey of Canada on a seasonal basis in 1882 and, permanently, in 1885. He was one of the last living links with the early history of that organization, as he was appointed during the directorship of Dr. A. R. C. Selwyn, only twelve years after the resignation of the founder, Sir William Logan. From the time of his appointment until his retirement in 1933 he carried on the methodical mapping of the southern half of Nova Scotia—that part underlain by the Meguma series—in which practically all of the then-important gold mines were found.

He commenced this lifework near Guysboro at the east end of the Nova Scotia mainland and, at the time of his retirement, was continuing the work south of Annapolis. The province was divided into equal rectangular areas, each twelve by sixteen miles, and at the time of his retirement, Faribault had published forty-seven map-sheets of such areas under his own name, and thirteen in co-authorship with the late Hugh Fletcher, another pioneer geologist, who, in a similar manner, was mapping those parts of Nova Scotia underlain by Carboniferous strata.

In addition to his systematic mapping of the Meguma areas of the province, Faribault mapped in detail the particular areas where workable gold-veins were encountered. Thirty-four of these plans were published on large scales, generally 500 feet to the inch, and the areas covered were designated "Gold Districts."

The production of both the areal geological maps and of the Gold District plans provided Dr. Faribault with much data for study of the origin of the gold ores. He was the first to realize that the productive veins of Nova Scotia were deposited in the shape of a saddle on the axes of anti-

clinal folds of interbedded quartzite and slate. And he also conceived the corollary of this observation: that other "saddle reefs" could with probability exist beneath the exposed saddles and nowhere be in evidence on the surface. Much of his writing in outside publications was in advocacy of a programme of deep mining to tap the unknown saddles that he was convinced lay beneath those being actively mined.

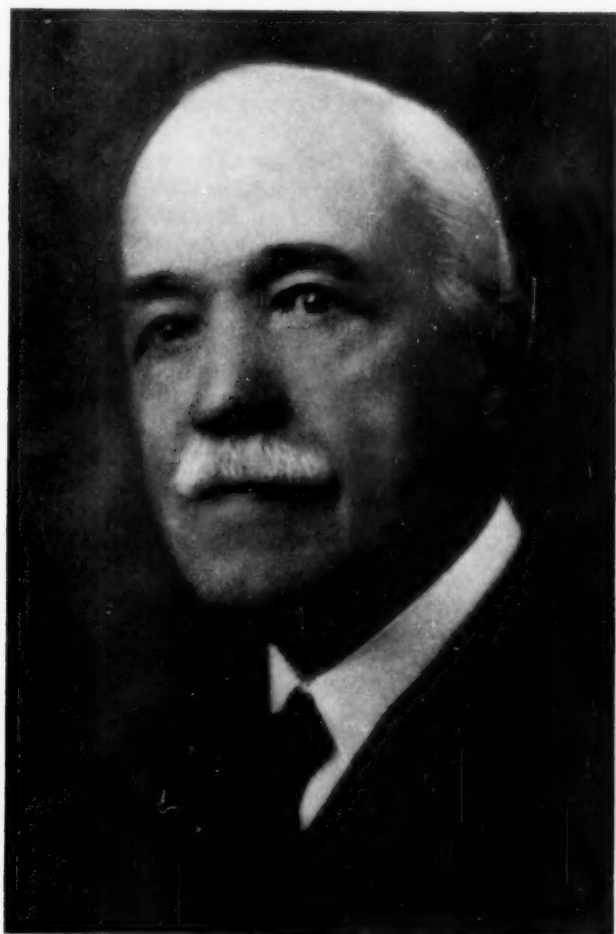
In the days when he commenced and performed much of this work, few, if any, maps existed, and certainly none of a standard to permit its use as a base for his geological maps. In the systematic mapping of the province, the drainage and the culture were mapped together with the geology. Roads were surveyed with an odometer patterned on one designed by Sir William Logan. Streams and lakes were mapped by pacing with a compass, the resulting surveys being tied to those of the odometer. Modern mapping methods have little altered the topographic base of Faribault's maps just as present-day geologists can make but few changes in the geology shown thereon.

Many societies honoured him and were honoured by his membership. Since 1888 he had been a corresponding member of the Nova Scotia Institute of Sciences. In 1892 he became a member of the Mining Society of Nova Scotia, and later was made an Honorary Member. He joined the Canadian Institute of Mining and Metallurgy in 1900, and was made a Life Member in 1933. He was elected a Fellow of this Society in 1910, and President of Section IV in 1923. In 1933 he was elected a Corresponding Member of the Geological Society of Belgium. In 1939 the Mining Society of Nova Scotia honoured him by unveiling a bronze plaque bearing his bust in bas-relief together with a short summary of his career. The plaque is in the Memorial Library of the Society of Halifax and replicas are in the several universities of the province. The citation on the plaque reads: "E. Rodolphe Faribault, C.E., B.A.Sc., D.Sc., F.R.S.C. An honorary member of the Mining Society of Nova Scotia, his geological research, persevered in through 51 years (1881-1932) of meritorious labour, constitutes the main basis of present knowledge of gold occurrences in Nova Scotia."

In 1950 a society of undergraduate geological students at St. Francis Xavier University, Antigonish, was formed and took the name of Faribault Geological Club.

In 1889 he represented Laval University at the Paris Universal Exposition. He represented the Canadian Government at the Columbian Exposition of 1893 and at the Paris International Exposition of 1900. At the latter exposition he was honoured for his exhibit of a mechanical block model portraying the geological structure in the vicinity of Goldenville, N.S. (this model is still on display in the Victoria Memorial Museum in Ottawa). In 1926 he represented the Geological Survey of Canada at the International Geological Congress in Madrid.

Dr. Faribault was a devoted family man and had been a respected member of Ottawa society since 1885. His charming and gracious wife,



EUGÈNE RODOLPHE FARIBAULT



the former Eva Montpetit of Ottawa, predeceased him in 1946. Surviving are five daughters: Jeanne, wife of Robert Blais of Ottawa; Gabrielle, wife of the Hon. C. P. Plaxton of Toronto; Aline, wife of Captain Yves Lamontagne, Counsellor of the Canadian Embassy at Berne; Pauline, wife of Jacques de Broin of Montreal; and Simonne, wife of Paul Rochon of Quebec. Also surviving are two sisters, Mrs. René de Salaberry and Miss Anne Faribault, of Ottawa; twenty-six grandchildren and fourteen great-grandchildren.

In his field of endeavour he was hard working and a strict disciplinarian, but he was a kindly man and one who inspired great loyalty in those who knew him well. Although he worked with the tools of a young and undeveloped science, his results will stand for many years, and he will always be known as the Grand Old Man of Nova Scotian Geology.

LUDLOW J. WEEKS



Léopold Houlé

1888-1953

LE nom de Léopold Houlé, décédé le 4 octobre 1953, a été constamment associé à la vie intellectuelle du Canada français depuis presque un demi-siècle. Cet enfant de la métropole, ses études achevées au Collège de Montréal, se dirigea sans hésitation vers le journalisme, pour lequel il se sentait des aptitudes innées. Ce ne fut pas le mirage de la politique, mais un penchant marqué pour les arts et les lettres, qui l'attira dans la carrière. Alors que la plupart de ses confrères passaient régulièrement d'un journal à l'autre, Houlé demeura au service de la *Patrie* pendant vingt-cinq ans, comme reporter, critique littéraire, secrétaire de la rédaction, chef de l'information, éditorialiste.

Lorsque fut créée, en 1933, la Commission canadienne de la Radio — devenue plus tard la Société Radio-Canada — il y entra comme directeur de la publicité et des relations extérieures. Nul n'était mieux qualifié pour ce poste. Durant quinze ans il put y étendre sans cesse son rayon d'action dans l'idéal d'apostolat intellectuel qu'il s'était fixé.

Préoccupé spécialement de l'avenir de notre littérature dramatique, il prit une part très active au mouvement du petit théâtre et composa plusieurs pièces qui furent jouées avec succès : *Le Presbytère en fleurs*, *Matines et laudes*, *Monsieur ne danse pas*, *Le député de l'Ungava*, *Lili reçoit*. La critique salua dans le *Presbytère en fleurs* la première œuvre dramatique vraiment canadienne. Montée en 1929, à l'occasion d'une fête de charité, elle connut cinquante reprises dans l'espace de trois ans; et elle continue d'être très en faveur auprès du public et des troupes d'amateurs. Lorsque Radio-Canada inaugura, en 1953, son « Théâtre du Canada », le *Presbytère en fleurs* eut l'honneur d'être le premier à l'affiche. Un autre témoignage du vif intérêt de Léopold Houlé pour notre littérature dramatique est son *Histoire du Théâtre au Canada*, qui lui valut un doctorat ès lettres de l'Université Saint-Joseph de Memramcook.

La pensée française sous tous ses aspects n'eut pas de plus valeureux champion. Il était toujours prêt à aider de sa plume et de sa parole tous les mouvements culturels. Il fut l'un des membres fondateurs de la Société du bon parler français. De la part de la France, il avait été favorisé d'une double distinction : Officier de l'Instruction publique et Officier d'Académie. Admis à la Société Royale du Canada en 1940, il se montra très assidu à y présenter des travaux et devint président de la section I en 1948-49.

Dans ses dernières années, contraint par la maladie à garder la chambre, il ne perdit jamais le contact avec les milieux de la presse et de la radio, où il avait tenu une si grande place durant toute sa vie active. Auprès des vieux camarades qui lui apportaient les bruits du dehors et des plus jeunes

venus en quête de conseils, il retrouvait sa verve d'autrefois, cet esprit légèrement caustique et sans méchanceté, cette large compréhension humaine qui lui valurent tant de durables amitiés.

Léopold Houlé appartenait à cette élite journalistique de chez nous dont il a ainsi caractérisé lui-même la vocation littéraire : « Elle naît de l'instinct de la résistance, de la nécessité de la lutte, du mépris des médiocrités satisfaites, de la haine du conventionnel, du faux intellectualisme des chapelles. »

DONATIEN FRÉMONT



LÉOPOLD HOULÉ



Charles Leonard Huskins

1897-1953

IN the death of Charles Leonard Huskins on July 26, 1953, the world of biological science lost much too soon one of its most energetic and productive workers. As author or joint author of over 125 published papers, Huskins, with the students he inspired and guided, helped greatly to establish the new science of cytogenetics as a powerful tool for shaping plants and animals nearer to man's desires.

Born in Walsall, England, Huskins migrated with his father's family to a farm west of Red Deer, Alberta, where his farming experience extended from 1911 to 1916. The winter of 1914-15 he spent at the Olds School of Agriculture, to which he returned in 1919-20 after three years of active service in the infantry and air force. The next year saw him at the University of Alberta, from which he received the degree of B.S.A. in 1923 and the M.Sc. in 1925. It was during this period that he became interested in the origin of fatuoid or false wild oats and the analogous speltoid forms of wheat, the subject of several of his earlier papers.

The quality of his graduate work at the University of Alberta earned him the 1851 Exhibition Science Research Scholarship in 1925. This took him to London, where he obtained the degree of Ph.D. in 1927. Then came three years of intensive research at the John Innes Horticultural Institution, at Merton. By this time Huskins' eager and independent thought had been sufficiently disciplined by substantial contact with mature, scientific minds, to make him fully ready to fill his own niche at McGill University, where he was appointed Associate Professor of Botany in 1930. Four years later he became Professor of Genetics, and organized a new department under that name.

Huskins had already published some papers in the field of animal genetics, and now his interest in this aspect of his subject intensified. He held a Guggenheim Fellowship in the Department of Zoology at Columbia University in 1942-3. Nor were his interests narrowly confined to the technical side of his work. In his list of published papers one finds such titles as "The Unifying Possibilities of Biology" and "Science, Cytology and Society."

In 1933 Huskins had returned briefly to London to receive the degree of D.Sc., awarded on the basis of published work, and in 1938 he spent some time at the University of California as Visiting Professor of Cytology. In 1945 he moved to the University of Wisconsin, as Professor of Botany. This move did not interrupt his active membership in the Royal Society of Canada, to which he had been elected in 1934. He continued to attend the meetings regularly, and always had stimulating papers to present. He was President of Section V in 1951-2.

Huskins married Margaret Villy in 1923, when they both graduated from the University of Alberta. This began an inseparable and intensely loyal partnership. Mrs. Huskins' talent for writing syndicated articles on their experiences helped finance the period of graduate studentship. That in the end they should pass on close together seemed not unfitting. Mrs. Huskins died on March 11, 1953. They left three children, Sheila, Olwen, and John Michael, the last, and youngest, being now a student at the University of Wisconsin. Huskins had nursed his wife almost continuously through the winter preceding her decease. His greatly valued secretary, Mrs. Sherry, died on March 29, 1953, at a time when Huskins was particularly busy preparing reports and other papers. His students came second only to his family in his loyalty and devotion. Trying to see to their interests in his weakened condition was too much, and the end came quickly. His life was short, but every bit of it counted.

ROBERT NEWTON



CHARLES LEONARD HUSKINS



Edouard Montpetit

1882-1954

EDOUARD MONTPETIT, membre de la Société royale du Canada, est décédé à Montréal, le samedi 27 mars, à l'âge de 72 ans. Admis au Barreau en 1904, M. Montpetit exerce d'abord, pendant trois ans, sa profession. Mais il a déjà, pour l'enseignement, une véritable vocation. Aussi fait-il en même temps un cours d'économie politique à la Faculté de Droit. Premier boursier de la Province de Québec, il va ensuite parfaire ses études en France. Diplômé de l'Ecole libre des Sciences politiques de Paris, il rentre en 1910 au Canada. On lui confie la chaire d'économie politique à l'Ecole des Hautes Etudes commerciales de Montréal. Il reprend en même temps son cours à la Faculté de Droit, où il enseigne en outre le droit romain.

En 1920, il est nommé secrétaire général de l'Université de Montréal où il fonde, la même année, l'Ecole des Sciences sociales, économiques et politiques, qu'il dirigera jusqu'en 1950. Il remplit aussi, à partir de 1931, les fonctions de directeur des relations extérieures de l'Université.

Son esprit judicieux et délié, sa formation, sa culture éclectique, son talent exceptionnel, sa parfaite distinction, tout désignait Edouard Montpetit pour le rôle d'ambassadeur intellectuel de son pays. Professeur agrégé de l'Université de Paris, il donne, en 1925, dix cours sur le Canada, en Sorbonne; en 1928, dix leçons sur le même sujet à l'Université de Bruxelles, et trois conférences à Mount Allison University.

Il est aussi chargé de plusieurs missions à l'étranger. Il représente, notamment, la Province de Québec aux fêtes du cinquantenaire de l'Université de Californie (Berkeley) en 1918, et l'Université de Montréal au congrès des universités de l'Empire britannique, en 1921. Le gouvernement canadien le délègue à la Conférence économique de Gênes et à la Conférence de La Haye, en 1922, puis, en 1935, à l'Assemblée de la Société des Nations.

Malgré la multiplicité des fonctions qu'il exerçait, M. Montpetit ne se déroba jamais quand on faisait appel à son dévouement. C'est ainsi qu'il fut tour à tour, et parfois en même temps, secrétaire général, puis vice-président du Comité France-Amérique, président de l'Institut scientifique franco-canadien, président de l'Association canadienne française pour l'avancement des sciences, membre de la Commission des écoles catholiques de Montréal, rédacteur en chef de *La Revue Trimestrielle Canadienne*, président de la Commission des assurances sociales, directeur général de l'enseignement technique de la province de Québec. Le désir de contribuer au progrès intellectuel, social et économique du Canada français donnait de l'unité à la multitude de ses travaux dont la dispersion n'était qu'apparente.

Ses actes aussi bien que ses œuvres avaient valu à M. Montpetit de nombreuses distinctions honorifiques, bien qu'il ne les eût jamais recherchées. Docteur de l'Université de Montréal, de l'Université Laval, de l'Université d'Ottawa et de McGill University, ainsi que de l'Université de Poitiers et de l'Université de Lyon, il était officier de la Légion d'Honneur, chevalier de l'Ordre de Léopold de Belgique, officier de l'Ordre de la Fidélité française et chevalier de Malte.

Orateur prestigieux, d'une éloquence brillante et sobre tout à la fois, Edouard Montpetit avait le don des formules. Certaines de ses trouvailles sont devenues des mots d'ordre. Dans ses discours et ses conférences, il savait toujours, selon les circonstances, captiver, émouvoir, convaincre. Jamais il ne refusait le concours de sa parole, qu'il s'agit d'accueillir un personnage éminent, de patronner quelque œuvre de bienfaisance, d'initier le public au problème social ou de vulgariser des connaissances nécessaires. Tout en inaugurant au Canada français l'enseignement méthodique de l'économie politique, il en a répandu le goût en démontrant à nombreux auditoires que cette science n'est pas ennuyeuse en soi.

Mais on ne garde jamais d'un orateur, quelque admiration qu'il ait suscitée, qu'un souvenir fugace. Heureusement, Edouard Montpetit laisse une œuvre importante et qui restera. Elle comprend, d'une part, des livres d'un caractère littéraire ou social, d'autre part, des ouvrages d'économie politique. *Les Survivances françaises au Canada*, *Au Service de la tradition française*, *French Canadian Cooperation*, *Le Front contre la vitre*, *D'azur à trois lys d'or*, *Reflets d'Amérique*, *Souvenirs et Propos sur la montagne*, qui honorent notre petite république des lettres, trouveront sans doute longtemps des lecteurs, parce qu'ils présentent, en un style châtié, des faits, des idées et des réflexions d'un intérêt permanent. Non seulement les étudiants, mais encore les personnes de plus en plus nombreuses que préoccupent les questions sociales et économiques voudront lire *Pour une doctrine*, *Sous le signe de l'Or*, *Les Cordons de la bourse* et les trois volumes de *La Conquête économique*. Tous y reconnaîtront les traits dominants du caractère de l'auteur : l'esprit public et le sens social.

Si utile qu'ait été sa grande activité intellectuelle dans les nombreux domaines où elle s'est exercée, c'est sans doute par son enseignement qu'Edouard Montpetit a eu sur son milieu l'action la plus profonde et la plus durable. Incomparable professeur, c'était en outre un précieux mentor. À l'exemple de ses vieux maîtres français, il se souciait, jusque dans ses cours, de l'élégance de la forme, qu'il ne jugeait pas incompatible avec la pédagogie. La limpidité de ses exposés et la finesse de sa pensée avivaient l'attention des jeunes, éveillaient leurs idées, suscitaient en eux l'ambition d'apprendre. Prompt à discerner les goûts et les aptitudes de chacun et obligeant par nature, il conseillait, guidait, encourageait ses élèves, qui se confiaient volontiers à lui.

Edouard Montpetit fut sans conteste le principal artisan de nos progrès dans un domaine que nous avons négligé. Son influence aura une portée



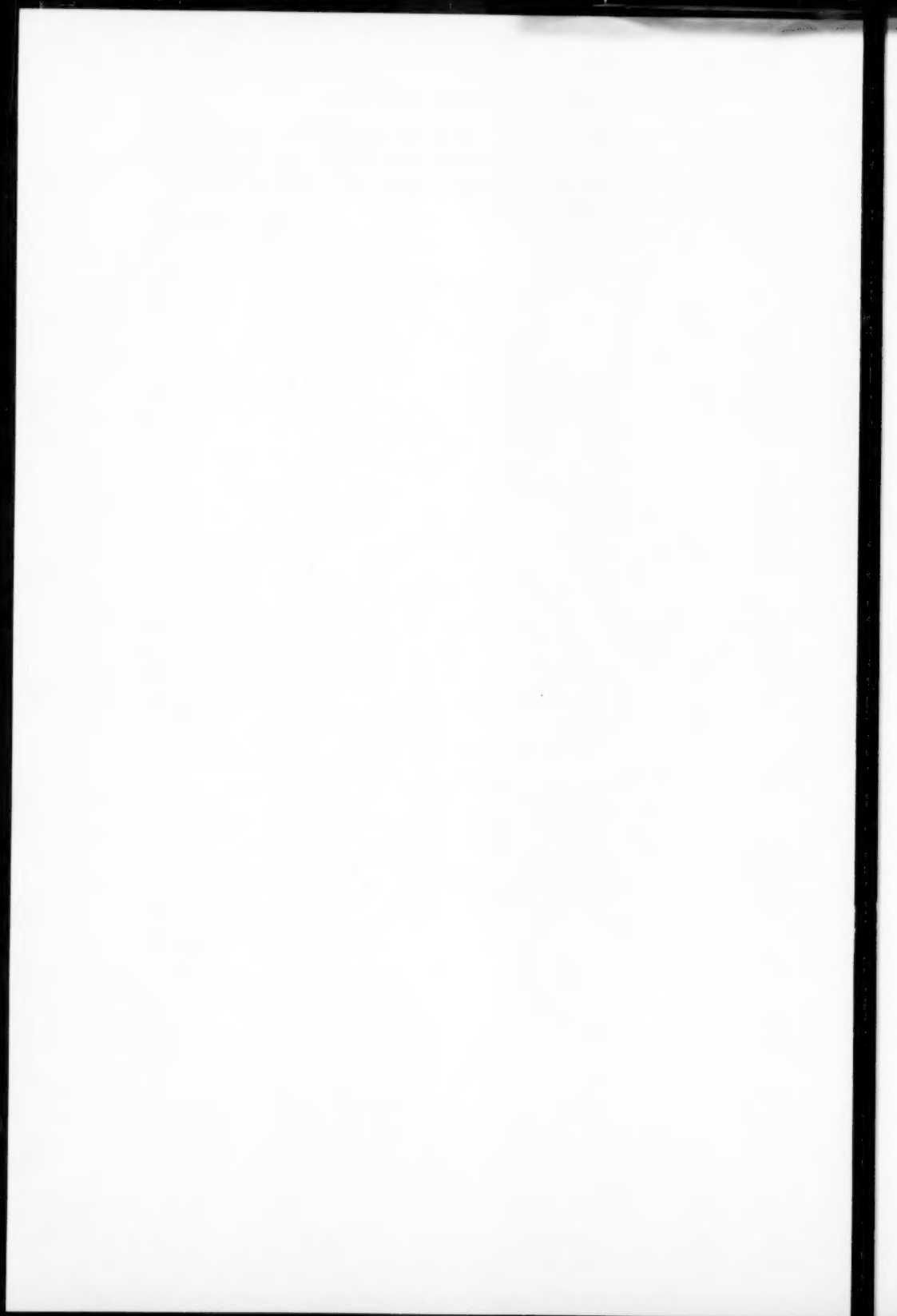
Studio Albert Dumas

EDOUARD MONTPETIT



incalculable. Non seulement a-t-il instruit une légion d'étudiants, dont il a favorisé le succès, et orienté ses auditeurs et ses lecteurs vers les problèmes économiques et sociaux, mais encore il a formé une élite qui prolonge son œuvre et assurera la relève.

LÉON LORRAIN



John Lyle Morison

1875-1952

IT is difficult to write an obituary notice of a man whom one has not seen for a third of a century, and with whom one's acquaintance before that lasted only a few years. Yet I can only accede to the request of the Secretary of the Royal Society to pay my tribute to his memory.

John Lyle Morison was born in Greenock, Scotland, on October 1, 1875. He was educated at the Greenock Academy and at Glasgow University; and he later pursued postgraduate studies in Oxford. From 1901 to 1907 he was a Lecturer in the Departments of History and Literature at Glasgow University; and in 1907 he came to Canada as Professor of History in Queen's University, Kingston. His tenure of this chair lasted fifteen years, though it was interrupted by the War of 1914-18, when he served with the 52nd (Lowland) Division in Egypt, Palestine, and France. After the war, he published his *British Supremacy and Canadian Self-Government* (London, 1919), a study of the struggle for responsible government in Canada which placed him in the first rank of Canadian historians. This he followed later with his life of *The Eighth Lord Elgin*, an equally important book. In 1921 he was elected a Fellow of the Royal Society of Canada; and then, suddenly, to everyone's surprise, he resigned in 1922 his chair as Professor of History in Queen's University, and returned to the Old Country. There he became Professor of History in Armstrong (now King's) College, Newcastle. So far as I know, he never returned to Canada; though some of his friends in Canada continued to receive from him brilliant but nostalgic letters.

Morison retired from his post at Newcastle as Professor Emeritus of History in the University of Durham in 1940; and he spent the later years of his life in a little Clydeside village, Innellan. There he died, on November 26, 1952, in his seventy-eighth year.

I cannot do better than reproduce here the estimate of Morison written by the present Professor of History at Glasgow, Professor Andrew Browning: "Handsome, debonair, impulsive, always ready to shoot folly as it flew, not invariably prudent himself, passing from an early reforming zeal to an aristocratic conservatism of outlook, Morison was unique. We shall long cherish his memory."

W. S. WALLACE





JOHN LYLE MORISON



Percy James Robinson

1873-1953

THE death in Toronto, on June 20, 1953, of Dr. Percy James Robinson has removed from the ranks of Section II of the Royal Society of Canada one of its senior Fellows. Dr. Robinson was born in Whitby, Ontario, on October 18, 1873, the son of George Hunter Robinson, the headmaster of the Whitby High School, and Agnes Fraser. He was educated in the Whitby schools, at the Jarvis Street Collegiate Institute in Toronto, and at University College, Toronto, which he entered with a scholarship in Classics. He graduated from the University of Toronto in 1897, with first-class honours in Classics. Five years later he obtained his Master's degree from the University of Toronto; and in 1934 the University conferred on him the honorary degree of Doctor of Letters.

After teaching for two years at Rothesay, New Brunswick, he joined the staff of St. Andrew's College, Toronto, in 1899; and he continued as Classical master at St. Andrew's, first in Toronto, and later in Aurora, until his retirement in 1946. He was an excellent teacher; but it was not only as an educationist that he especially made his mark. While still a comparatively young man, he became interested in the origin of the place-names in the Georgian Bay, where he spent his summers, and this led him to a study of the Indian languages. This in turn led to inquiries into various phases of early Canadian history, which bore fruit in 1934 in the publication of his *Toronto during the French Régime*, a book that pushed back the history of the Toronto region by a hundred years. Later, the Champlain Society published his translation into English of Du Creux's *Historia canadensis*, with an introduction by himself, and notes by Professor J. B. Conacher (2 vols., Toronto, 1951-2). After his death, there appeared in *Ontario History* a most interesting and erudite paper on the origin of the name Toronto, under the heading "More about Toronto."

He was elected a Fellow of Section II of the Royal Society of Canada in 1937. In 1905 he married Esther Alice, daughter of Armand Toutant de Beauregard; and in 1944 their son, Professor Gilbert de B. Robinson, was elected a Fellow of Section III. I do not remember another instance of father and son being Fellows of the Royal Society of Canada at the same time.

W. S. WALLACE

THEORY OF THE EARTH

BY J. H. VAN DIJK

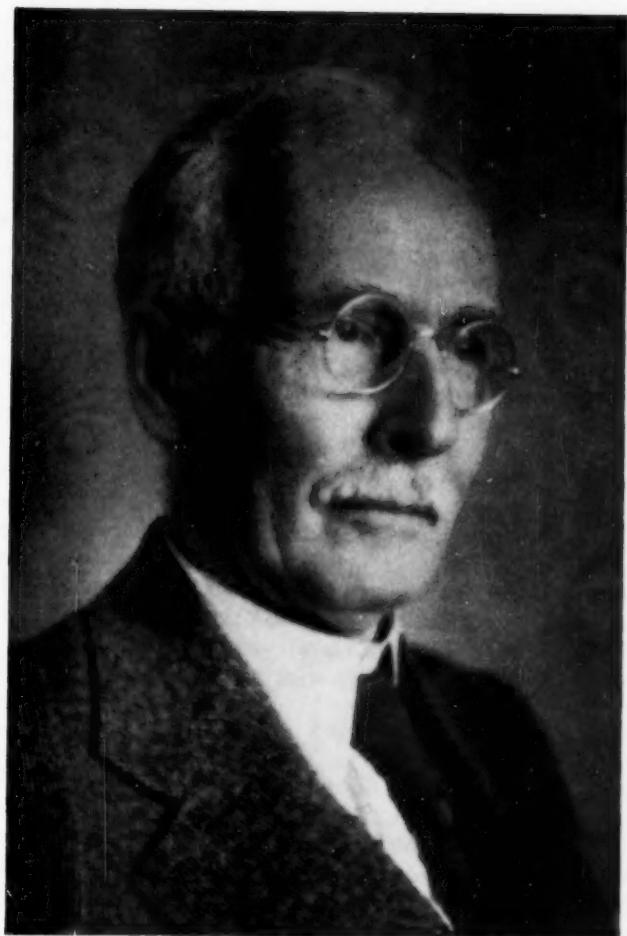
The theory of the earth is a branch of geology which deals with the origin and development of the earth and its various parts. It is a science which seeks to explain the processes which have shaped the earth and its features. The theory of the earth is based on the study of the earth's structure and its history. It is a science which seeks to explain the processes which have shaped the earth and its features. The theory of the earth is based on the study of the earth's structure and its history.

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PERCY JAMES ROBINSON



Pierre-Georges Roy

1870-1953

LES Roy ou Leroy sont originaires de Dieppe. Les centaines de Canadiens qui portent aujourd'hui ce nom descendent à peu près tous de Nicolas Roy et de Jeanne Lelièvre, débarqués à Québec le 22 septembre 1663. L'un des descendants s'est appelé Léon Roy. Il fut notaire à Lévis, et père de treize enfants dont l'un, né le 23 octobre 1870, reçut au baptême les prénoms de Pierre-Georges. L'ainé, Joseph-Edmond, devint à son tour notaire, et le plus jeune également, Eugène-Adjutor. A des titres divers, ces trois fils de Léon Roy ont eu le culte de l'histoire du Canada. Comme le rappelait un jour M. Victor Morin, ils lui ont consacré leur vie. Mais si tous les trois ont possédé « l'histoire de leur pays avec une telle maîtrise qu'ils en rédigeaient les annales encore plus rapidement qu'il était possible de les lire », le plus fécond fut incontestablement Pierre-Georges Roy. L'œuvre de Joseph-Edmond, ancien président général de la Société Royale et conservateur-adjoint des Archives du Canada, est certes fort appréciable. Son *Histoire de la seigneurie de Lauzon*, en cinq volumes, est un modèle du genre et, comme le disait l'auteur lui-même, l'une de ces pierres que l'ouvrier consciencieux apporte à l'édifice commun. Adjutor a eu, lui aussi, la passion de la petite histoire. Nous pouvons être certains que ses patientes recherches autant que sa connaissance du passé ont trouvé leur emploi dans les travaux de ses frères. Par le nombre et la variété des ouvrages, de même que par sa vie, tout entière consacrée aux archives, et par les gestes qu'il a posés, Pierre-Georges Roy mérite la première place dans notre admiration et notre reconnaissance.

Le tout jeune homme — il avait vingt ans à peine — qui lançait, vers 1890, une petite revue ayant pour titre *Le Glaneur*, manifestait déjà le tempérament dont il était animé, traduisait l'idéal dont il entendait faire une réalité. A cette époque, l'histoire du Canada était encore en friche. Certes, quelques-uns des grands courants en étaient connus, grâce à Garneau et à l'abbé Casgrain, entre autres; de rares travaux, antérieurs ou postérieurs à l'avènement du régime anglais, comme ceux de Charlevoix, de Sagard, de Rameau de Saint-Père et de Parkman, permettaient d'en dégager les principales constantes. Mais les archives, dispersées en France comme au Canada, en Angleterre comme aux Etats-Unis, demeuraient à peu près inaccessibles. Et que de questions restaient sans réponse parce que les documents authentiques étaient inconnus ! Que de personnages, obscurs ou non, que de faits, d'importance première ou relative, attendaient d'être projetés dans leur vraie lumière !

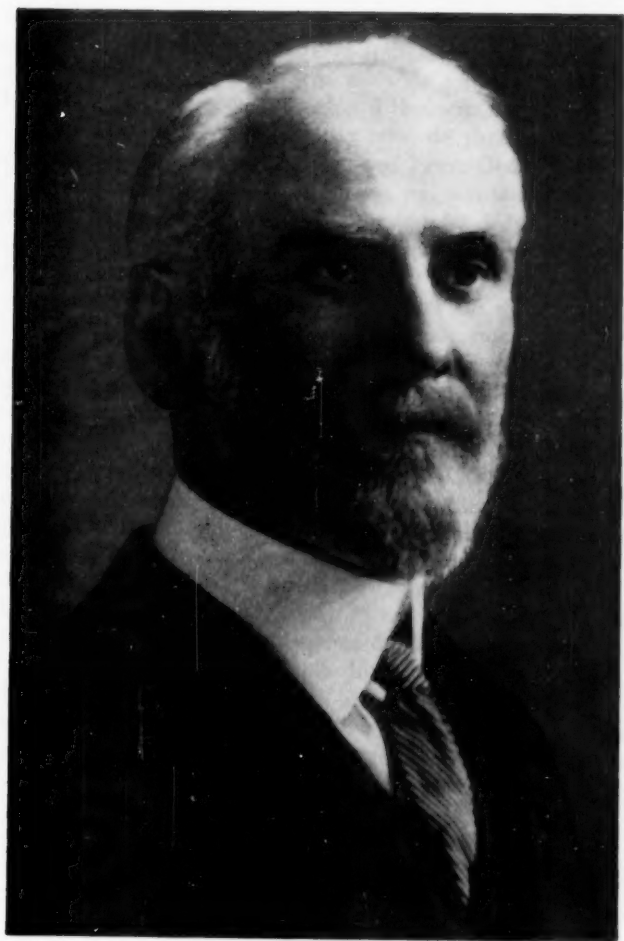
Fouiller le sol, déblayer le terrain : telle était la tâche urgente, aux yeux de Pierre-Georges Roy, la véritable histoire nationale étant impossible avant « le jour où des monographies nombreuses auront déblayé le terrain

et préparé la voie à nos historiens ». Dans les circonstances, cela voulait dire faire la chasse aux documents, les déchiffrer, les analyser, les commenter, en tirer les réponses aux cent, aux mille questions que les curieux se posaient. Aussi bien, quand il parut, en 1895, le *Bulletin des recherches historiques* comblait une lacune. Près de soixante ans sont passés depuis que le premier numéro de la petite revue à couverture blanche sortit des presses, à Lévis, et le *Bulletin* a surmonté tous les obstacles, défié toutes les tempêtes. Aujourd'hui comme hier, il rend service, et ce n'est pas le moindre mérite de Pierre-Georges Roy d'avoir veillé sur lui avec un soin jaloux jusqu'aux dernières années de sa vie, jusqu'à l'heure où l'infatigable chercheur se résolut à le confier aux soins diligents de son fils Antoine.

La publication du *Bulletin des recherches historiques* était loin de suffire à l'activité débordante de Pierre-Georges Roy, pas plus que ses trente ou quarante pages ne pouvaient répondre aux exigences des historiens. La création d'un service d'archives provinciales s'imposait. Un jour vint où il y eut, dans le gouvernement, un ministre apte à comprendre la nécessité de cette création et déterminé à l'entreprendre. Ce fut Athanase David, secrétaire de la Province. Et l'homme capable de la mener à bonne fin ne pouvait être que Pierre-Georges Roy.

En 1920, le fils du notaire Léon Roy avait cinquante ans. Fonctionnaire, il avait déjà entrepris le classement et le dépouillement des documents dont le secrétaire de la Province avait la garde. Sans posséder la formation technique de l'archiviste, il en avait le flair et la patience. Il avait surtout l'amour du métier et, quoiqu'il ne pût s'appuyer sur aucune directive précise, il était devenu en quelque sorte le gardien attentif et jaloux d'un véritable trésor. Auteur de quelques douzaines de livres, il avait été élu, en 1911, à la section de littérature française (section I) de la Société Royale. Il ne comptait plus ses correspondants canadiens et étrangers, tellement il était l'obligeance et la courtoisie mêmes. Sa nomination, le 1er septembre 1920, au poste d'archiviste de la province de Québec, ne surprit personne. Elle le combla d'aise. « Je m'étais, écrivait-il, attaché à ces vieux papiers jaunis, effacés, indéchiffrables pour les profanes, mais si éloquents pour ceux qui savent les faire parler. » Pierre-Georges Roy n'avait pas attendu la consécration officielle pour les faire parler. Revêtu désormais d'une autorité qui soutiendrait et prolongerait son action, disposant de moyens qui lui permettraient de servir plus efficacement la science historique, il continuerait à faire parler les vieux papiers jaunis. Mais surtout, grâce à lui, les vieux papiers parleraient pour un nombre croissant de chercheurs. Dès 1921, paraissait le premier *Rapport de l'Archiviste*, dont l'imposante série — plus de trente volumes de 400 pages chacun en moyenne — est devenue l'indispensable instrument de travail de tous les historiens du Canada.

C'est en 1941 que Pierre-Georges Roy, dont les yeux s'étaient usés à la tâche, cessa d'être le conservateur des Archives de la Province, sans toutefois renoncer à servir. Entre temps, il avait vu s'élever le « bâtiment à l'abri du feu » qu'il réclamait en 1922 — comme l'intendant Hocquart en avait



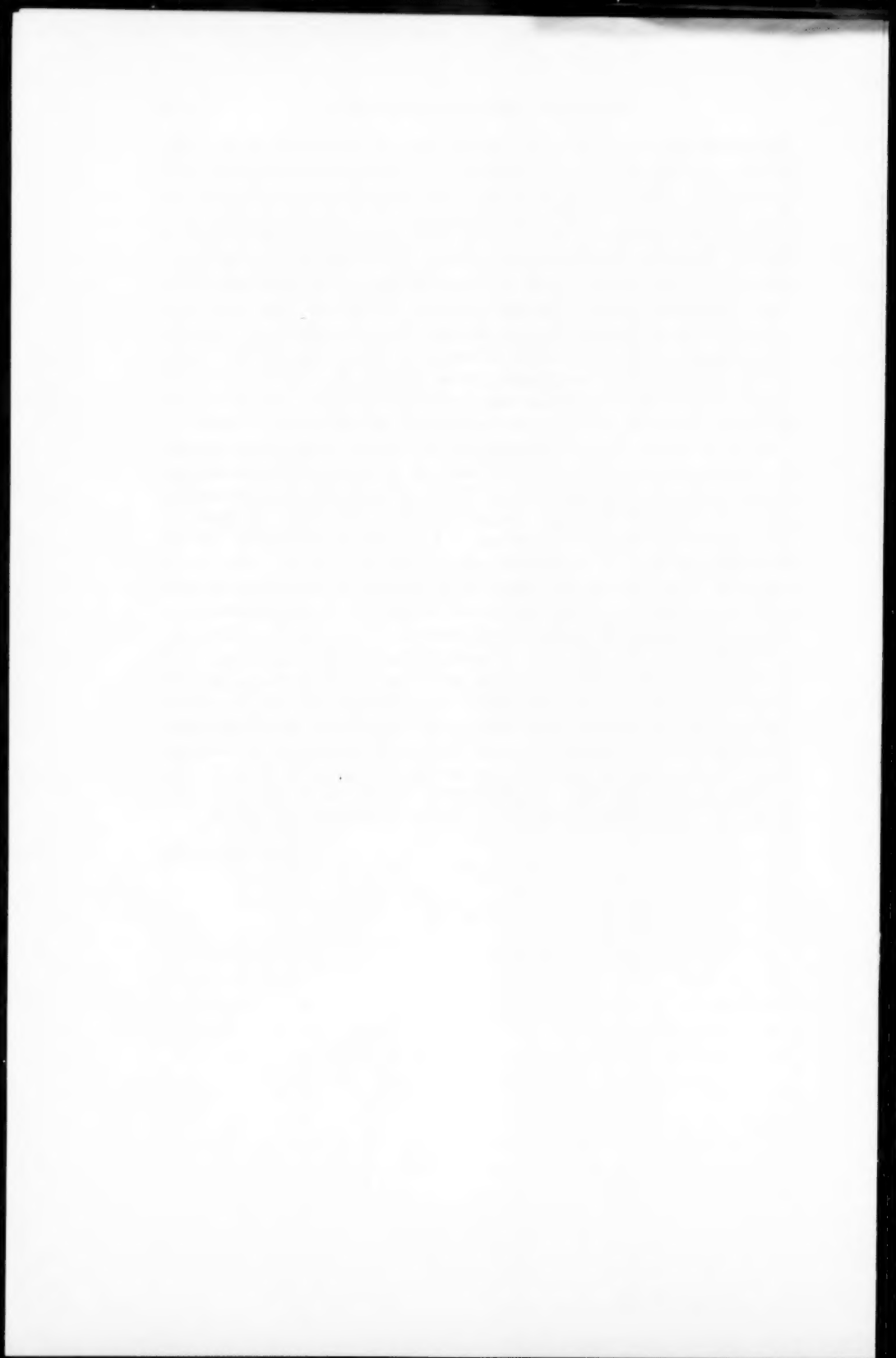
PIERRE-GEORGES ROY



réclamé un, deux siècles plus tôt — pour y loger les archives de la Nouvelle-France, « les plus précieuses de toutes ». A ses fonctions d'archiviste en chef, il avait joint celles de conservateur du Musée de la Province et de secrétaire de la Commission des Monuments Historiques. Les honneurs ne lui avaient pas manqué : présidence de la section française de la Société Royale du Canada, Médaille Tyrrell pour l'ensemble de son œuvre, décorations — dont la croix de chevalier de la Légion d'Honneur — et doctorats. Et les livres, plaquettes, articles n'avaient pas cessé de paraître non plus, à un rythme étonnant. De fait, on peut dire que Pierre-Georges Roy a tenu la plume jusqu'aux derniers mois de sa longue vie. Son œuvre entière, y compris les communications nombreuses parues dans les *Mémoires* de la Société Royale et les études reproduites dans les *Cahiers des Dix* — il fut l'un des premiers « Dix », en 1935 — doit compter tout près de trois cents titres.

Le 4 novembre 1953, l'indomptable ouvrier de notre petite histoire, l'« ouvrier rudimentaire », comme il disait de lui-même, trop modestement, s'éteignait sans bruit. Il avait un jour écrit : « Depuis près d'un demi-siècle, j'ai plutôt vécu avec les morts. J'aime les vivants, mais mon admiration et mon respect vont surtout aux défunts. » Le parfait gentilhomme, que fut Pierre-Georges Roy, est maintenant parmi ceux avec qui il a vécu par la pensée. Il faudra dire, dans le détail, ce qu'a été sa vie laborieuse, les multiples services qu'il a rendus, sans jamais compter sur la reconnaissance de ceux qu'il obligeait. Il faudra surtout analyser l'œuvre qu'il a bâtie sans prétention, mais avec conscience. L'œuvre n'est certes pas sans défaut, mais ce n'est point la moue dédaigneuse de petits maîtres arrogants qui peut en amoindrir le mérite ni en ternir l'éclat. Pierre-Georges Roy n'a pas été un figuier stérile. Se tenant à égale distance de l'optimisme béat et du pessimisme infécond, il a donné l'exemple du travail persévérant et consciencieux. Nul hommage ne pouvait mieux lui convenir que celui de la *Gazette*, de Montréal, à la date du 7 novembre 1953 : « The life of this man had a quality of completeness and devotion that few other lives ever obtain. »

JEAN BRUCHÉSI



Herbert Leslie Stewart

1882-1953

THE ranks of higher education in Canada suffered a great loss in the passing on September 19, 1953, of Professor Herbert Leslie Stewart, M.A., Ph.D., F.R.S.C., known to millions as "Dr. Stewart of Dalhousie," and familiarly in his own university as "Herbie." Canada has lost an outstanding citizen, Dalhousie an eminent scholar, and this Society a distinguished member.

Dr. Stewart was a gift to Canada from Ireland. A son of the manse, he was brought up in Cairncastle and Carrickfergus, County Antrim. In his voice there was always the music evoked by those place-names. At the age of 19 he enrolled in Lincoln College, Oxford. He graduated from Oxford with honours in Classics, and he received the M.A. and Ph.D. degrees from the Royal University of Ireland. He studied theology for three years at Edinburgh, and he was duly licensed to preach for a call; but his call came from the classroom rather than from the kirk. After two years of university teaching in Belfast, he came to Canada and accepted in 1913 the George Munro professorship of Philosophy in Dalhousie University. For thirty-four years he held that chair. Retirement brought no diminution of his energies, and he was active nearly until the day of his death.

In Canada he played many parts on and beyond the campus: teacher, author, editor, publicist, and churchman.

As teacher, he was brilliant in exposition, and his vitality and his Irish wit will live in the memory of generations of students. His magnificent use of the English language made his lectures, as well as his writings and his public addresses, inspiring.

As author, he illuminated many scholarly areas, and with an unusual talent for felicitous yet cogent writing he contributed to the permanent records of philosophic scholarship. "Questions of the Day in Philosophy and Psychology," "Nietzsche and the Ideal of Modern Germany," "Anatole France, the Parisian," "A Century of Anglo-Catholicism," and "Modernism, Past and Recent" are some of the titles that, in themselves, bear witness to the variety and the timeliness of his interests. In recognition of his scholarship, this Society elected him a Fellow in 1920.

In 1921 he founded the *Dalhousie Review*, and for twenty-six years he was its editor; as founder, editor, and frequent contributor, he gave to the *Review* an abiding flavour and distinctiveness.

For years his voice was in many respects the voice of Dalhousie and of Canada, through his broadcast commentaries on public affairs. These were heard for many years on a national network; there are homes from Cape Breton to Vancouver Island, and in the United States, where he was, Sunday after Sunday, an eagerly awaited guest.

As churchman, he was loyal to the religion of his youth, and in the councils of the Presbyterian Church in Canada he was a doughty contender and gifted leader.

To all these divergent spheres of activity he brought a capacity for hard work that was nigh inexhaustible. His fine mind, tempered by classical training and schooled in dialectic, was positive and creative; in him there was no taint of the despairing and destructive cynic; he was a philosopher and a believer. He exemplified and he defended the freedom of the mind and the spirit; he was implacable in resisting the threat of bureaucracy or autocracy in institutions private and public, academic and governmental. He did not suffer fools gladly, but with his intolerance of shoddy and humbug he combined the saving graces of humour and understanding. He attained a balance between the zeal of the scholar and the zest of the publicist.

While some of his contemporaries deplored his excursions from the ivory tower, yet it must be recorded that through his writings in newspapers and popular periodicals, and most of all through his broadcasts, he demonstrated the value of a scholarly approach to problems of public concern, and he did much to bring the academic and non-academic worlds into closer accord.

It would not be fitting to close this testimonial without making reference to one who helped in no small measure, until her death in 1951, to inspire and assist Dr. Stewart's remarkable career of service—his wise and gracious wife.

SIDNEY SMITH



HERBERT LESLIE STEWART



APPENDIX C



TITLES AND ABSTRACTS OF PAPERS
PRESENTED AT THE ANNUAL MEETING



PROGRAMME OF PAPERS



SECTION I. LITTÉRATURE FRANÇAISE, HISTOIRE, ETC.

1. Voyage en Grèce (1905). Par Mgr Emile Chartier, M.S.R.C.

L'Auteur a pensé qu'après 50 ans, les notes prises par lui au jour le jour, lors d'un pèlerinage aux pays d'Homère, offriraient peut-être quelque intérêt à un certain nombre d'intellectuels. Il les publie aujourd'hui telles quelles, laissant aux voyageurs décents le soin de comparer leurs observations avec les siennes.

2. Esquisse de géographie humaine. Par Donatien Frémont, M.S.R.C.

Les trois éléments qui entrent dans la population de langue française à l'ouest des Grands Lacs — Métis aborigènes, Canadiens de l'Est et des Etats-Unis, Français et Belge d'Europe — se sont intégrés de façon uniforme dans chacune des provinces. Le culte dont ils entourent leur langue première ne doit pas être interprété comme un manque d'esprit national. Bien au contraire, en persistant à parler les deux langues officielles du pays, ces Franco-Canadiens marquent leur fidélité à une tradition vénérable et l'usage d'un droit naturel provenant de l'origine même de la Confédération canadienne.

3. Céramique du Québec. Par Jean Marie Gauvreau, M.S.R.C., et Paul Riou.

L'essor extraordinaire des arts céramiques dans la Province de Québec est indéniable. Ce mémoire a pour objet d'exposer une étude à la fois historique, critique, technique et de faire ressortir une fois de plus l'indispensable collaboration de l'art et de la technique. Les auteurs tiennent à souligner l'exceptionnel hommage rendu aux céramistes du Québec, qui, grâce à la générosité du Ministère de l'Industrie et du Commerce ont eu la chance exceptionnelle d'être admis au Musée de Faenza, Italie, centre mondial de recherches et de renseignements sur les arts céramiques. Pierre Normandeau, Chef de la Section de Céramique de l'Ecole du Meuble de Montréal, doit être considéré comme le grand responsable de cet incontestable mouvement artistique.

4. Comme l'aigle en sa superbe, noir et crucifié de lumière. Par Maurice Hébert, M.S.R.C.

Le Témoin fait de virulents reproches à Don Juan. Celui-ci le repousse et emmène dans son château Dona Juana qui le suit trop volontiers. Don Juan invoque devant Dona Juana les instants déjà passés avec elle et il se glorifie de penser qu'ils soient tous deux au-dessus de la morale et des lois. Mais la grâce travaille sourdement l'âme du pécheur et de sa compagne, quoiqu'ils exaltent le ravissement de leurs vies jointes et cette gloire de dominer le monde. Le Témoin reparait, qui rappelle à Don Juan toutes les fautes que celui-ci a commises, l'innocence et les promesses de son enfance et la chaste douceur de l'amour de Dona Sol. Le remord entre enfin en l'âme de Don Juan et de Dona Juana. La grâce miséricordieuse renouvelle ses efforts en l'âme des amants. Et Dieu parle, avec une puissance souveraine. Ce sera la dernière intervention du Ciel, avant le châtimement, si Don Juan et Dona Juana ne se convertissent point, *hasta el corazon y alma*. C'est l'amour que Don Juan a toujours secrètement gardé pour Dona Sol absente, qui ouvre en lui le chemin au repentir, par le regret de cette tendresse infiniment pure, à l'image de Dieu. Les touches de la grâce sont tout autres en Dona Juana : contagion du remords, terreur de l'au-delà, etc...

Section I

5. Aperçu des premiers des peuplements de l'ouest. Par Gustave Lanctôt, M.S.R.C.

La recherche de la fourrure pousse les Français à l'Ouest du lac Supérieur, de Radisson à La Noue. En vue d'atteindre la Mer du Sud, La Vérendrye établit des postes jusqu'à la Saskatchewan. Avec la conquête, accroissement du nombre de postes et de voyageurs. Le système des brigades engendre les établissements sur place et crée le groupe métis. Colonie de la Rivière Rouge. L'union des Compagnies du Nord-Ouest et de la Baie d'Hudson développe la culture et l'habitation. Débuts de la colonisation. Diversité des éléments et leur répartition. Sommaire démographique de la colonie à son entrée dans la Confédération sous le nom de province au Manitoba.

6. Racine et Sophocle. Par Maurice Lebel, M.S.R.C.

Les annotations de Racine. Les principaux thèmes de Sophocle et de Racine. L'esprit de la tragédie racinienne. La composition, l'exposition, l'intrigue, l'action, les péripéties, le dénouement, le style, les principales images. Rapprochement entre les tragédies de Sophocle et de Racine. Les tragédies de Racine ressemblent peut-être plus à celles de Sophocles qu'à celles d'Euripide par l'esprit, la facture et le style.

7. Florianopolis. Par Mgr Olivier Maurault, M.S.R.C.

Cette étude sur *Florianopolis* du Brésil fait partie d'un triptyque de villes inconnues dont les deux autres panneaux sont *Pesme* de France et *Luderitz* d'Afrique (déjà présentés à la Société Royale du Canada).

L'auteur raconte la fondation de Florianopolis, expose sa situation géographique au bord de l'océan Atlantique, décrit l'aspect extérieur de la ville, et esquisse un tableau de sa population au point de vue de la religion de la culture intellectuelle du commerce et de l'industrie.

8. La mort d'un homme. Par Adrien Plouffe, M.S.R.C.

Récit de l'agonie d'un homme et réflexions sur l'angoisse des croyants et des incroyants devant la mort qui s'en vient. Pour les uns, c'est l'approche de Dieu. Pour les autres, c'est le néant. Alors, dans les deux cas, pourquoi cet effroi indicible qui marque les derniers instants de la vie ?

9. Présentation d'un manuscrit : « Fables et Compagnie ». Par Adrien Plouffe, M.S.R.C.

Monologues, chansons et faibles. Leçons de bonté, de courage, de sobriété, de sagesse, de charité, de dévouement et de gros bon sens, à l'usage des enfants et des grands enfants que restent toujours les hommes.

10. Quelques mots sur deux lettres inédites. Par Adrien Plouffe, M.S.R.C.

Ces pages de 1916 démontrent bien le fossé profond qui séparait Sir Wilfrid Laurier et M. Henri Bourassa. Photostat des deux documents.

11. L'Anecdote. Par Louis-Philippe Robidoux, M.S.R.C.

L'auteur, après avoir vainement cherché la définition exacte de l'anecdote, rappelle le mot de Barbey d'Aurevilly, qui disait qu'elle est « la concentration même de l'Histoire ».

Il présente ensuite une ample cueillette d'anecdotes amusantes ou cinglantes, sur les hommes de lettres, les musiciens, les peintres, les médecins, etc...

SECTION II. ENGLISH LITERATURE, PHILOSOPHY, SOCIAL SCIENCES, ETC.

Monday, May 31

10.00 A.M.—General Meeting of the Society.

11.00 A.M.—Presidential Address: The Tragic Figure of the Wyf of Bath.
By F. M. Salter, F.R.S.C.

The modern tendency is to overlook Chaucer the moralist. We neglect the Tale of Melibeus and the Parson's Tale and we skip solid moralizing whenever we can. Our aversion from such materials also blinds us to the implicit moral when Chaucer, as he frequently does, lets the facts speak for themselves. The Wyf of Bath is admittedly garrulous; but when her life is closely examined she becomes less the comic creation universally enjoyed as such, than a genuinely tragic figure. Elements of the comic may be present—as, indeed, they are present in *King Lear*, which is not therefore a comedy.

2.00 P.M.

1. Business Meeting.

2. Symposium, Sections I and II—"French Settlements in Canada West of Lake Superior."

(1) Esquisse de géographie humaine. Par Donatien Frémont, M.S.R.C.

Les trois éléments qui composent la population de langue française à l'Ouest des Grands Lacs — Métis indigènes, Canadiens de l'Est et des Etats-Unis, Français et Belges d'Europe — se sont intégrés de façon uniforme dans chacune des provinces. Le culte dont ils entourent leur langue première ne doit pas être interprété comme un manque d'esprit national. Bien au contraire, en persistant à parler les deux langues officielles du pays, ces Franco-Canadiens marquent leur fidélité à une tradition vénérable et l'usage d'un droit naturel provenant de l'origine même de la Confédération canadienne.

(2) Aperçu des premiers peuplements de l'Ouest. Par Gustave Lanctôt, M.S.R.C.

La recherche de la fourrure amène les Français à l'Ouest du lac Supérieur, de Radisson à LaHoué. En vue d'atteindre la Mer du Sud, La Vérendrye établit des postes jusqu'à la Saskatchewan. Avec la conquête le nombre des postes et des voyageurs se multiplie. Le système des brigades engendre l'établissement sur place, et la naissance du groupe métis. L'habitation de la Rivière Rouge, avec Selkirk, ouvre l'ère de la colonisation. L'union des Cies du Nord-Ouest et de la Baie d'Hudson développe la culture et le groupement local. L'arrivée des missionnaires consolide la fixation sur place. Débuts d'une colonisation agricole. Diversité de ces éléments et leur répartition régionale. Sommaire démographique avant la Confédération.

(3) St. Boniface. Par Gabrielle Roy, M.S.R.C.

(4) Problems of French Settlement in Western Canada.
By G. F. G. Stanley, F.R.S.C.

There are three French-language groups in Western Canada: Métis, Canadien, and French. Each of these groups was faced with very special problems in adjusting itself to its surroundings; but common to all is the basic problem of Canadian culture, namely the survival of a minority group and its own culture in the midst of a strong alien majority.

Section II

Tuesday, June 1

9.00 A.M.—Symposium—"So Little for the Mind."

(1) Comments and Queries. By F. H. Underhill, F.R.S.C.

We owe a great debt to Miss Neatby for this timely and able book. Has there come to be a vested interest of ignorance enrolled under the banner of Education? Miss Neatby has not said so, nor has she called those who direct our schools within eight of the nine English-speaking provinces by rude names. She has merely quoted some of them and allowed her readers to reflect on their sayings. But I doubt whether many of us like most of what they say. There is, however, one considerable reservation to make about the major premiss of the book—that John Dewey caused all the mischief. Was not Dewey a symptom of a prevailing tendency, rather than its cause? However that may be, is it possible that Miss Neatby is encouraging us in the favourite Canadian pastime, of looking for an American scapegoat?

(2) An Attempt to Clarify Some Issues. By Andrew Moore.

Let us imagine an extreme example of what is sometimes called a "Traditional School." We all know the common criticisms of that type of school. But what can be said in its favour? Now let us picture an extreme example of the so-called "Progressive School." The champions of this type claim that it has many merits. But what are the defects? My daily task of inspecting the secondary schools of Manitoba allows me to see both the defects and the desirable results of the impact of the "Progressive" theory on our education today. Could I therefore attempt to make some practical suggestions for improvement?

(3) First Principles. By N. A. M. MacKenzie, F.R.S.C.

Education involves the whole man. High academic standards must always be aimed at. But physical and mental health cannot be forgotten. Another objective is the appreciation of various kinds of the aesthetic. Consequently the pressures on the school system will continue. Miss Neatby has dealt so convincingly with the present neglect of the needs of the "brighter than average" pupil that it would seem that for some time to come we shall have to concentrate on them. But if, in doing so, we forget the other things our schools will still fail.

(4) Problems of Three-dimensional Education. By F. E. L. Priestley, F.R.S.C.

The paper notes the present concern over the separation of Science and the Humanities. How can these two disciplines be reconciled or rather reunited in our educational system? This particular problem is now recognized as critical for us. But it is only one aspect of a general problem neither new nor simple. One or two suggestions will be made.

2.00 P.M.

1. Poetry as Knowledge. By F. H. Anderson, F.R.S.C.

The place of poetry in a classification of knowledges; the emancipation of poetic criticism from theology, ethics, systematic metaphysics, and discursive science. Classic views are considered, but the paper mainly considers the contributions of modern naturalism, including psychoanalysis and kindred sorts of self-expressionism.

Section II

2. The Duchy of Teschen as a *Zwischenland*. By W. J. Rose, F.R.S.C.
The historical, geographical, and ethnic features of a tiny world in the heart of Europe, isolated by administrative and other boundaries. Some details of its regional loyalties and the consequent tensions developing in the machine age. The threat of an international conflict after the collapse of the Empires in 1918. With a sketch map.

3. New Maps of Historic Sites in Nova Scotia. By H. L. Cameron. Presented by Watson Kirkconnell, F.R.S.C.

Aerial photographs made in 1945 of old dikes at Grand Pré probably identified the original Acadian enclosure. Further infra-red and Sonn  photographs may reveal more details and even the original village site. Photography at Louisburg and the results there.

4. Some Pictographs of Southeastern British Columbia. By D. Leechman, F.R.S.C.

Paintings on rock surfaces are widely distributed in the interior of southern British Columbia. Many attempts have been made to interpret the designs. Most of them, if not all, were made by adolescents who recorded in this way their supernatural experiences while on the spirit quest or in the seclusion required by puberty ceremonies. Three groups of pictographs are described in detail. Illustrated by slides.

Wednesday, June 2

9.00 A.M.

1. Rights of Minorities in a Democracy. By C. B. Sissons, F.R.S.C.

Observations on a notable but neglected speech by John Sandfield Macdonald.

2. Economic Growth: Doubts and Misgivings. By Eugene Grasberg.
Presented by B. S. Keirstead, F.R.S.C.

In contemporary theory constant economic growth is both an objective in itself, and a preventative of disturbance. Admittedly, to aid economic growth is important if Western ethical tenets are not to be belied by the actual conduct of Westerners. Doubts about the goal and the means.

3. The Frontier and Democratic Theory. By S. D. Clark, F.R.S.C.

Too much stress has been laid on European influences, and it has been supposed that difference between the political experiences of Canada and the United States is to be attributed to our following nineteenth-century democratic theory and their following eighteenth. This has led to the neglect of the influence of the frontier, in Canada even more than in the United States.

4. Christian Symbol in Seventeenth-Century Poetry. By Malcolm Ross.
Presented by Northrop Frye, F.R.S.C.

2.00 P.M.—Business Meeting.

3.00 P.M.—General Meeting of the Society.

SECTION III. CHEMICAL, MATHEMATICAL AND PHYSICAL SCIENCES

Summary of Programme

Monday, May 31

11.00 A.M. Business Meeting, Room 107, Science Building.

2.00 P.M. Presidential Address and invited papers—Room 107, Science Building.

Tuesday, June 1. Sub-section meetings as follows:

9.00 A.M. Mathematics—Room 115, Science Building.

9.00 A.M. Nuclear Physics—Room 107, Science Building.

9.00 A.M. Spectroscopy and Astrophysics—Room 219, Science Building.

2.00 P.M. Chemistry—Room 219, Science Building.

2.00 P.M. Mathematics—Room 115, Science Building.

2.00 P.M. General Physics—Room 107, Science Building.

Wednesday, June 2. Sub-section meetings as follows:

9.00 A.M. Solid State and General Physics—Room 107, Science Building.

9.00 A.M. Nuclear Physics—Room 219, Science Building.

9.00 A.M. Chemistry—Room 115, Science Building.

11.30 A.M. Business Meeting of the Section—Room 107, Science Building.

Monday, May 31

11.00 a.m.—Business Meeting of the Section—Room 107, Science Building.

2.00 p.m.—Presidential Address and invited papers—Room 107, Science Building.

1. Synthesis and Spectra of Chemical Substances. By P. E. Gagnon, F.R.S.C.
2. The Spectra of Free Radicals. By G. Herzberg, F.R.S.C.
3. The Recombination of Free Radicals. By E. W. R. Steacie, F.R.S.C.
4. Isotope Effects in Chemical Reactions. By H. G. Thode, F.R.S.C.

Tuesday, June 1

9.00 a.m. and 2.00 p.m. Sub-section MATHEMATICS—Room 115, Science Building. PAPERS 5-21.

5. The Inducing Process in the Modular Representation Theory of S_n . By G. de B. Robinson, F.R.S.C.

In the modular representation theory the relation between the inducing and restricting processes is given by Nakayama's formulae. In brief, if we induce on an indecomposable

of the regular representation of S_n we obtain a sum of indecomposables of S_{n+1} , which belong in general to different p -blocks. In this paper we study the consequences of limiting the inducing process to r -inducing, where r is some residue modulo p . This restricts attention to a single block and makes it possible to give a simple expression for the change of weight in the general case.

6. On Dually Differentiable Plane Arcs. By Peter Scherk, F.R.S.C.

Let $D: P = P(t)$ be a dually differentiable parameter arc in projective plane. Thus (i) the straight line $P(t_0)P(t)$ converges, say to $p(t_0)$, if $t \rightarrow t_0$; (ii) $p(t)$ is continuous; (iii) $p(t_0) \cap p(t)$ converges to $P(t_0)$ if $t \rightarrow t_0$. The structure of D near any $P(t)$ is described by means of a 3×2 matrix M yielding a classification of the points $P(t)$ into 144 types all of which exist. A duality transforms D into a dually differentiable arc D^* . M determines the characteristics (a_0, a_1) and (a_0^*, a_1^*) of D and D^* at t .

7. On Elementary Points. By Peter Scherk, F.R.S.C.

No three points of an arc of order two are collinear. A point on an arc has order two (is elementary) if it has a neighbourhood (two disjoint one-sided neighbourhoods) of order two. D is maximally differentiable at $P(t_0)$ if $P(t)P(t') \rightarrow p(t_0)$ and $p(t) \cap p(t') \rightarrow P(t_0)$ whenever $t, t' \rightarrow t_0$; $t \neq t'$. Results: (i) $P(t_0)$ has order two $\leftrightarrow D$ is maximally differentiable at $P(t_0) \leftrightarrow a_0(t) = a_1(t) = a_0^*(t) = 1$ for every t near t_0 ; (ii) $P(t_0)$ is elementary $\leftrightarrow a_0(t) = a_0^*(t) = 1$ for every $t \neq t_0$ near t_0 . (iii) A differentiable arc is maximally differentiable everywhere if and only if each of its points has order two.

8. On Solutions of $x^d = 1$ in Symmetric Groups. By Leo Moser and Max Wyman, F.R.S.C.

Let $A_{n,d}$ denote the number of solutions of $x^d = 1$ in the symmetric group of degree n . A relation is established between $A_{n,2}$ and the Hermite polynomials $H_n(x)$. This leads to a refinement of some results of Chowla, Herstein and Moore (Can. Jour. Math. 3, 1951: 328-334). By another method, asymptotic formulae for $A_{n,p}$ are obtained. Some arithmetic properties of $A_{n,d}$ are proved, extending results of the paper mentioned above and of results proved by E. Jacobsthal (Norske Vid. Selsk. 21, 1949: 49-51) and Chowla, Herstein and Scott (Norske Vid. Selsk. 21, 1952: 49-51). It is shown how some of these results can be extended to alternating groups.

9. Tangents to Ovals with Two Equichordal Points. By Lloyd Dulmage. Presented by H. S. M. Coxeter, F.R.S.C.

G. A. Dirac has shown (J. London Math. Soc. 27, 1952: 429) that there are no closed convex curves with two equichordal points for which the ratio a of the distance between these points to the length of the chords satisfies $a > \frac{1}{2}\sqrt{3}$. He has shown also that the slopes of tangents to such curves vary continuously. In this note, various tangent properties are established as a result of which it is shown that there exists no oval with two equichordal points and a continuous tangent for which

$$a > \left(\frac{2}{3}\right)^{3/2}.$$

(These results were obtained in 1953 at the Summer Research Institute of the Canadian Mathematical Congress.)

Section III, Tues., Mathematics

10. Some Recent Developments in the Theory of Series. By M. S. Macphail, F.R.S.C.

For a conservative summation method A , the effects of two assumptions " FAK " and " PMI " have been studied by Zeller (Math. Z. 55, 1951: 55-70) and Wilansky (Duke Math. J. 19, 1952: 647-660) respectively. It is now shown that if A is conservative and reversible, FAK and PMI are equivalent. Furthermore, if A is reversible, regular, and has FAK or PMI , then for every matrix B not weaker than A we have the representation

$$B - \lim x = \rho A - \lim x + \sum b_k x_k,$$

valid for each A -summable sequence x . Here

$$b_k = \lim_n b_{nk},$$

and

$$\rho = \lim_n \sum_k b_{nk} - \sum_k \lim_n b_{nk}.$$

11. Summable Trigonometric Series. By R. D. James, F.R.S.C.

The author has previously defined a P^n -integral of Perron type which goes directly to a generalized n th primitive (Trans. Amer. Math. Soc. 76, 1954: 149-176). It is shown in the present paper that if a trigonometric series is summable (C, k) , $k = 0, 1, 2, \dots$, to a function $f(x)$ for $0 \leq x \leq 2\pi$, and satisfies certain other conditions, then $f(x)$ is necessarily P^{k+2} -integrable. Moreover, the coefficients of the trigonometric series are given by obvious modifications of the usual formulae for Fourier coefficients.

12. The Connection between Continuity and Angle Sum in Hyperbolic Geometry. By Lloyd Dulmage. Presented by H. S. M. Coxeter, F.R.S.C.

M. Dehn has shown (Math. Ann. 53, 1900: 404) the possibility of having a triangle whose angle sum is greater than or equal to two right angles in plane hyperbolic geometry, provided there are no continuity assumptions. Here it is shown that if, in a plane hyperbolic geometry, Archimedes' axiom holds, or if the parallels possess bounding lines, the angle sum is less than two right angles. However, Cantor's axiom may hold without restricting the angle sum. A geometry is constructed with angle sum less than two right angles, for each possible combination of the continuity axioms.

13. Substitution Groups of Formal Power Series II. By S. A. Jennings. Presented by R. D. James, F.R.S.C.

This paper is a continuation of an earlier paper with the same title (to appear in Can. J. Math. 8, July 1954). A detailed study is made of the Group G of formal power series of the form

$$x + a_1 \frac{x^2}{2!} + a_2 \frac{x^3}{3!} + \dots$$

when the coefficients a_1, a_2, \dots are integers and the group operation is formal substitution. In particular the commutator structure of the factor-group $G^* = G/P$, where P is the normal subgroup of G of all series whose coefficients are divisible by a prime p , is determined.

14. Asymptotic Behaviour of the Inverse of a Laplace Transform. By T. E. Hull and C. Froese. Presented by R. D. James, F.R.S.C.

A method is developed which enables one to determine the asymptotic behaviour of a function from the behaviour of its Laplace transform near a singularity. The method will

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handle known cases such as when the transform behaves, near the singularity, like $s^{-\alpha}$ or $s^{-\alpha} \ln s$ near $s = 0$, as well as others such as when the transform behaves like $s^{-\alpha}/\ln s$ or $s^{-\alpha} \exp(k/s)$. Conditions for the validity of the method are imposed only on the transform so that nothing need be known about the function itself and the main result is therefore in the form of an Abel theorem on the inversion integral.

15. On the Limits of Riemann Sums. By Israel Halperin, F.R.S.C., and Normal Miller.

Let $F(t)$ be a bounded function on the unit interval with values in an arbitrary linear normed space M and let S denote the set of its Riemann limits. P. Hartman and R. L. Jeffery, using different methods, have shown that S is convex whenever the dimension of V is finite. By sharpening the inequality of Steinitz which was used by Hartman we extend the proof of convexity of S to the case of a space V with inner product but arbitrary dimension. The proof by Jeffery extends to a class of spaces of non-finite dimension which does not include the inner product spaces.

16. Haar Functions and the Basis Problem for Banach Spaces. By H. W. Ellis and Israel Halperin, F.R.S.C.

Although it is not yet known whether every separable Banach space has a basis it has been shown that this result does hold for the space L^p ($1 \leq p < \infty$) of functions $f(x)$ on $S = (0, 1)$. In this case the Haar functions are known to be a basis. In the present paper the existence of a basis is shown for a wide class of L^p spaces (which include the L^p spaces) on arbitrary measure spaces S . The basis is constructed by a procedure which generalizes that used by Haar and the usual properties of such Haar systems are established now by purely measure-theoretic means (without the use of topological notions).

17. Co-ordinates in Geometry. By K. D. Fryer and Israel Halperin, F.R.S.C.

J. von Neumann has shown that every complemented modular lattice of order which is finite but more than three, can be co-ordinatized with co-ordinates in some suitable regular ring. In the present paper the von Neumann treatment is simplified and shortened.

18. Note on Permutations in a Finite Field. By K. D. Fryer. Presented by Israel Halperin, F.R.S.C.

The permutations

$$\begin{aligned} P: x' &= x + 1 \\ Q: x' &= mx^{q-2} \end{aligned}$$

in $GF(q)$ generate the symmetric group on q symbols if

(1) m is a quadratic residue mod q , $q = 4n + 1$, or (2) m is a quadratic non-residue mod q , $q = 4n + 3$. They generate the alternating group on q symbols if (3) m is a quadratic residue mod q , $q = 4n + 3$, or (4) m is a quadratic non-residue mod q , $q = 4n + 1$.

19. Chain Transforms. By Charles Fox. Presented by W. L. G. Williams, F.R.S.C.

This paper defines and studies a system of integral equations called chain transforms of order n . The system consists of n equations falling into two groups as follows:

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$$(1) \quad g_{p+1}(x) = \int_0^{\infty} r_p \left(\frac{x}{u} \right) g_p(u) \frac{du}{u},$$

$$(2) \quad \int_0^{\infty} l_q \left(\frac{x}{u} \right) g_{q+1}(u) \frac{du}{u} = g_q(x),$$

where p and q , between them, run through the first n positive integers. The system is a chain transform of order n if (i) $g_i(x)$, $i = 2, 3, \dots, n$, occurs twice, once on each side of these equations, and (ii) $g_{n+1}(x) = g_1(x)$.

When $n = 2$ the system specializes to the well-known Generalized Fourier transform (E. C. Titchmarsh, *The Theory of the Fourier Integral*, chapter 8) and when $n = 3$ it includes some systems known as Iterated transforms (*ibid.*, chapter 11), which occur in Laplace transform theory.

If $L_q(s)$ is the Mellin transform of $l_q(x)$, (*ibid.*, p. 46) and $R_h(s)$ that of $r_h(x)$ then I establish the following as the main condition that (1), (2) should form a chain transform of order n :

$$(3) \quad \prod_q L_q(s) = \prod_p R_p(s),$$

where, in forming the products, p and q run through all their possible values. If there are no equations of type (2) in the system then the left-hand side of (3) must be replaced by 1, and if there are no equations of type (1) then the right-hand side of (3) must be replaced by 1.

In addition to (3) there are convergence conditions. I prove two theorems, one for the case of ordinary convergence and one for convergence in mean square. The results include as a special case those of my previous paper on chain transforms (*J. London Math. Soc.* 23, 1948: 229-235).

20. On Ordered Finitely Generated Solvable Groups. By Rimhak Ree.
Presented by R. D. James, F.R.S.C.

The following results are obtained: (i) Any ordered group satisfying the maximal condition for subgroups is generalized nilpotent. (ii) Every ordered solvable group satisfying the maximal condition for subgroups is nilpotent. (iii) Any linear ordering of a finitely generated, torsion free nilpotent group G is a lexicographic ordering associated with some central series

$$G = F_1 \supset F_2 \supset \dots \supset F_k \supset F_{k+1} = 1,$$

where F_i/F_{i+1} is infinite cyclic, $i = 1, 2, \dots, k$. However, it is shown that there exist finitely generated solvable groups which are linearly ordered but are not nilpotent (e.g., the group F/F'' , where F is a free group with a finite, or countably infinite set of generators).

21. Summability of Generalized Bernstein Polynomials. By P. L. Butzer.
Presented by W. L. G. Williams, F.R.S.C.

Let $f(x) \in L[0, 1]$, then the generalized Bernstein polynomials defined as

$$P_n^f(x) = \sum_{r=0}^n (n+1) \binom{n}{r} x^r (1-x)^{n-r} \int_{r/(n+1)}^{(r+1)/(n+1)} f(t) dt$$

have the property that

$$\lim_{n \rightarrow \infty} P_n^f(x) = f(x)$$

a.e. in $[0, 1]$ (see Butzer, *Trans. Roy. Soc. Canada*, 3rd series, vol. 46, sect. III, 1952:

23-27). In this note it is shown if $f(x)$ is defined on $[0, 1]$, $|f(x)| \leq M$, the sequence $\{P_n^f(x)\}$ is summable $(C, -1)$ to $f(x)$, i.e.

$$\mathfrak{P}_n^f(x) \equiv (n+1)P_n^f(x) - nP_{n-1}^f(x) \rightarrow f(x)$$

at every point $x \in [0, 1]$ where $f''(x)$ exists. If $f(x)$ has a modulus of continuity

$$\omega(\delta) = O(\sqrt{\delta}), \quad 0 \leq x \leq 1,$$

then

$$\lim_{n \rightarrow \infty} \mathfrak{P}_n^f(x) = f(x)$$

uniformly in every interval

$$[\epsilon, 1 - \epsilon], \quad 0 < \epsilon < \frac{1}{2}.$$

Furthermore, there exist functions continuous on $[0, 1]$ such that the $\mathfrak{P}_n^f(x)$ diverge at a given point x , $0 < x < 1$.

9.00 a.m.—Sub-section NUCLEAR PHYSICS, Room 107, Science Building. PAPERS 22-32.

22. Electron Energy Distributions. By J. E. Till and H. E. Johns, F.R.S.C.

Tables are presented giving the energy distribution of electrons set in motion in an absorbing material due to the photoelectric, Compton and pair processes for a wide range of photon energies. Methods of using the tables to calculate the initial distribution of electrons produced in an element of volume and the electron flux through a cm^2 are presented. These distributions are useful in determining the energy absorbed and the ionization produced in a cavity within the scattering material.

23. Experimentally Determined Electron Energy Distributions Produced in Water by Cobalt 60 Radiation. By W. R. Bruce and H. E. Johns, F.R.S.C.

Electron distributions have been determined using organic scintillators, a photomultiplier, and a pulse height analyser. The effects of field area and depth on the distributions were determined. The investigations are being extended over a greater range of photon energies and with greater resolving power, using a 90° beta-ray spectrometer for analysing the electron energies.

24. Automatic Isodose Plotter. By G. A. Mauchel and H. E. Johns, F.R.S.C.

The distribution of radiation in a scattering medium, produced by an X-ray machine, is usually represented by a set of isodose curves which give the ratio of the dose at the point in question to the maximum dose. A device has been developed which causes a small ionization chamber to seek out and follow any desired isodose curve. Chamber movements are plotted automatically in the control room yielding a set of isodose curves. Movements of the chamber are independent of fluctuations in X-ray output. A set of isodose curves can be obtained in about 10 minutes.

25. Calculations of Tumour Dose in Rotation Therapy. By G. F. Whitmore, M. T. Morrison and H. E. Johns, F.R.S.C.

The present trend in radiation therapy is towards the use of rotation therapy with either the machine, the patient, or both in motion during the treatment. Exact calculations of the tumour dose during such treatment are very complicated. Approximate methods using the

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concept of "tumour-air" ratios have been developed and these will be discussed. Extensive tables covering the range from 200 Kv to Cobalt 60 have been prepared and their use will be illustrated.

26. Disintegration of Tl^{208} (3.1 min). By L. G. Elliott, F.R.S.C., R. L. Graham, J. Walker, and J. L. Wolfson.

Using magnetic and scintillation spectrometer techniques, a study has been made of the radiations coincident with the 2.615 Mev. γ -ray in Pb^{208} . In addition to the levels in Pb^{208} at 2.615, 3.198, 3.475, and 3.709 Mev. (L. G. Elliott, R. L. Graham, J. Walker, and J. L. Wolfson, *Phys. Rev.* **93**, 1954: 356) evidence has been obtained for the existence of a fifth excited state at 3.961 Mev. Gamma-ray transitions of energies 252 and 763 kev. proceeding from this state have been studied in the internal conversion spectrum, and the 763 kev. transition in the γ -ray spectrum. Analysis of the β -spectrum of Tl^{208} yields intensities for the β -ray components consistent with the measured intensities of the γ -ray transitions in Pb^{208} .

27. The γ - γ Directional Correlation of Er^{166} . By J. C. D. Milton and J. S. Fraser. Presented by L. G. Elliott, F.R.S.C.

The directional correlation of the 1380 and 81 kev. γ -rays excited in the β -decay of Ho^{166} shows unambiguously that the spins of the 1460 and 81 kev. levels are 0 and 2 respectively and indicates a probable spin of 2 for the 1680 kev. level. The large quadrupole moment and relatively long lifetime of the 81 kev. state make observation of the directional correlation difficult, but satisfactory results have been obtained using a source of $\text{Ho}(\text{NO}_3)_3$ maintained above the melting point. The strong coupling approximation of the Bohr-Mottelson hydrodynamic theory (A. Bohr and B. Mottelson, *Dan. Mat. Fys. Medd.* **27**, no. 16, 1953), which is expected to be valid for Er^{166} , predicts vibrational and rotational states having properties consistent with those observed.

28. Electron Capture Cross Sections. By Harry Schiff. Presented by H. Grayson-Smith, F.R.S.C.

Electron capture cross-sections were calculated in the first Born approximation for alpha particles passing through hydrogen and singly charged helium ions passing through helium using the complete interaction Hamiltonian. Estimations of captures into excited states were made with the help of the partial cross-sections obtained in a simple closed form using only the (incident ion)-(electron) interaction. The results indicate that the first Born approximation, using the complete interaction, is quite adequate in the velocity range given by $e^2/\hbar v \gtrsim 1$. An impact parameter calculation for protons in hydrogen shows that the cross-section obtained using only the (incident ion)-(electron) interaction gives unphysical results at low velocities ($e^2/\hbar v \sim 1$), and that most of the contribution to the cross-section arises from impact parameters $p > a_0$, where a_0 is the radius of the first Bohr orbit in hydrogen.

29. Integrated Cross-Sections of Photonuclear Reactions. By J. A. Kuehner and B. W. Sargent, F.R.S.C.

Absolute integrated cross-sections have been measured for photonuclear reactions produced in copper, zirconium, niobium, and molybdenum by 70 Mev. synchrotron X-rays. A 4π solid angle proportional counter was introduced for measurements of absolute disintegra-

tion rates. Self-absorption in the sample foils was treated experimentally. The photon flux was measured with a Victoreen ionization chamber in lucite. Values of integrated cross-section for the (γ, n) reactions in Cu^{63} , Cu^{65} , Mo^{92} , Zr^{96} , Mo^{100} are 0.85, 0.92, 1.35, 1.47, 1.65 Mev.-barns respectively. The integrated cross-sections for the (γ, p) reactions in Zr^{94} and Mo^{98} are 0.12 and 0.15 Mev.-barn respectively.

30. Cross-section for the Reaction $\text{Al}^{27}(\gamma, n)\text{Al}^{26}$. By R. N. H. Haslam, W. N. Roberts, and D. S. Robb. Presented by L. Katz, F.R.S.C.

The cross-section for the reaction $\text{Al}^{27}(\gamma, n)\text{Al}^{26}$ has been remeasured by the determination of Al^{26} activity. The results are in agreement with an earlier value obtained by the activity method, but differ from the result obtained by neutron detection. The discrepancy is thought to be due to complexity in the Al^{26} decay scheme. The reaction threshold is measured as 13.4 ± 0.2 Mev., the maximum energy of positrons from Al^{26} is 3.2 ± 0.1 Mev., and the half-life is determined as 6.5 ± 0.1 sec.

31. On the Intermediate Coupling of the d^4 Configuration of Nuclear Shell Structure. By Seiichi Sueoka. Presented by D. C. Rose, F.R.S.C.

Following the method of a previous paper on the d^3 configuration (Phys. Rev. **93**, 1954: 302), we have derived all the matrix elements of the spin-orbit interaction for d^4 configuration in the following form:

$$\begin{aligned} & (d^4 TSL, TJM | \sum (s_i l_i) | d^4 T'S'L', T'JM) \\ & = (-1)^{S+L'-J} \cdot 12\sqrt{5}[(2S+1)(2S'+1)(2L+1)(2L'+1)]^{\frac{1}{2}} \cdot \\ & W(SLS'L'; J1) \cdot \sum_{T_1 L_1 S_1} (-1)^{S_1+L_1-\frac{1}{2}-S'-L'} (d^4 TSL | \{ d^3(T_1 S_1 L_1) d, TSL \} \\ & W(\frac{1}{2} S \frac{1}{2} S'; S_1 1) \bar{W}(2L2L'; L_1 1) (d^3(T_1 S_1 L_1) d, T'S'L') \{ d^4 T'S'L' \}. \end{aligned}$$

The coefficients of fractional parentage are obtained from H. A. Jahn's paper (Proc. Roy. Soc., London, **205**, 1951: 192), using only the reduction of the representations of the symmetric group. All the matrices for different values of T and J are obtained. Using the perturbation method, we will discuss the energy levels in the cases of $d^{-2}d^{-1}$ and $d^2s^2d^2$.

32. The Gravitational Field of Electric and Magnetic Dipoles by G. E. Tauber. Presented by D. C. Rose, F.R.S.C.

It has been possible to obtain exact solutions of the field equations of general relativity for empty space containing electrostatic and magnetostatic fields. The cylindrical co-ordinates of Weyl have been used for which gravitational potentials only depend on x_1 and x_2 . Maxwell's equations have been solved under the assumption that the non-vanishing components of the four-vector (A_3 and A_4) only depend on g_{44} . In particular for the case of an electric dipole at the origin

$$A_4 = \frac{Px_1}{r^3}, A_3 = 0$$

the gravitational field was found to be

$$g_{11} = g_{44}^{-1} = 1 - 2\sqrt{\pi} \frac{Px_1}{r^3} + 2\pi \frac{P^2 x_1^2}{r^6} \quad r^2 = x_1^2 + x_2^2$$

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in close analogy to the point-charge solution. A similar solution was found for a magnetic dipole

$$A_3 = \frac{M x_2^2}{r^3}, A_4 = 0$$

m replacing p in the above solution. Finally, the field due to a superposition of an electric and magnetic dipole was obtained and it was seen that the appropriate constant d characterizing the solution depends on the ratio of magnetic to electric dipole strength through $d = 2\sqrt{\pi(1+c^2)}P$, where $c = M/P$.

9.00 a.m.—Sub-section SPECTROSCOPY and ASTROPHYSICS, Room 219, Science Building. PAPERS 33–47.

33. Intensities, Electronic Transition Moments, and Vibrational Transition Probabilities of Diatomic Molecules. By R. W. Nicholls, P. A. Fraser, R. G. Turner, and W. R. Jarman. Presented by A. D. Misener, F.R.S.C.

Methods have been developed which enable accurately calculated values of overlap integrals $\int \psi_v' \psi_v'' dr$ of diatomic molecular vibrational wave functions to be used together with experimentally determined band intensities to determine the form of the electronic transition moment $R_e(r)$ of the electronic transition concerned. Vibrational transition probabilities $|\int \psi_v' R_e \psi_v'' dr|^2$ in which the conventional simplifying assumption that $R_e(r)$ is independent of r has not been made, have thereby been determined for a number of transitions. Reliable values of such vibrational transition probabilities for molecular band systems are of great importance in the interpretation of spectra from inaccessible sources, usually of astrophysical interest. Results so far obtained will be presented.

This work has been assisted by the Air Force Cambridge Research Centre.

34. Induced Infra-red Absorption in Hydrogen and Hydrogen-Foreign Gas Mixtures at Pressures in the Range 500 to 5,000 Atmospheres. By W. F. J. Hare and H. L. Welsh, F.R.S.C.

The pressure-induced infra-red absorption of hydrogen was studied in the range 500 to 5,000 atm. At high densities an anomalous increase in the integrated absorption coefficient is observed for the fundamental band, and interpreted in terms of the finite size of the perturbing molecule. The splitting of the Q branch shows a departure from the linear variation with density in the higher pressure range; the effect is more pronounced for the heavier perturbing gases. Little change in the contour of the overtone and double-transition bands is observed, even at the highest densities.

35. Induced Infra-red Absorption of Carbon Dioxide at High Densities. By V. Gaizauskas and H. L. Welsh, F.R.S.C.

The induced infra-red absorption of the totally symmetric ν_1 vibration in gaseous and liquid carbon dioxide has been investigated at densities from 60 to 450 Amagat units and at temperatures from -50°C to 90°C . The integrated absorption coefficient increases more slowly than the square of the density and is independent of the temperature. The intensity of the induced absorption in the pure gas is exceptionally large as compared with the enhancement by foreign gases. A weak component has been detected between the two peaks of the Fermi doublet in the liquid at -50°C .

36. Raman Spectra of Gaseous Ethylene and Ethane. By J. Romanko, T. Feldman and H. L. Welsh, F.R.S.C.

The rotational and rotation-vibrational Raman spectra of ethylene and ethane have been examined with a reciprocal linear dispersion of 10 cm^{-1} per mm. In ethylene the rotational spectrum shows subsidiary lines which have no counterpart in a symmetric top spectrum; these are interpreted from the theory of the asymmetric rotator. In ethane fine structure of the doubly degenerate fundamentals, ν_{10} and ν_{11} , has been observed. Analysis of the ν_{11} band in conjunction with infra-red data on the $\nu_{11} + \nu_4$ band determines the torsional frequency ν_4 . Anharmonicity effects account for a fine structure of the totally symmetric frequency.

37. The $\lambda 4050$ Bands of the C_3 Molecule. By A. E. Douglas. Presented by G. Herzberg, F.R.S.C.

The group of bands, commonly known as the $\lambda 4050$ comet bands, have been excited in the laboratory and photographed under high dispersion. From a study of the bands when excited with the C^{12} and also with the C^{13} isotope it has been shown that the bands are emitted by a C_3 molecule. High dispersion spectra have been studied in an attempt to analyse the bands and to determine the structure of the molecule.

38. The Ionization Potential of Helium. By G. Herzberg, F.R.S.C., and R. Zbinden.

Spectroscopic values for the ionization potential of helium I(He) at present in the literature claim only an accuracy of $\pm 15\text{ cm}^{-1}$. In view of the possibility of a shift of the ground state of helium similar to the Lamb shift of hydrogen, an attempt is being made to obtain a more precise value for I(He) by an accurate measurement of the wave-length of the resonance line of He at 584 \AA . A provisional result based on a comparison of the 5th and 10th order He line with 2nd and 4th order iron lines leads to a wave-length of 584.329 \AA for the He line and therefore an ionization potential of 198312.5 cm^{-1} . Judging from the agreement of the 5th and 10th order plates, it is estimated that the maximum error of this value is $\pm 2\text{ cm}^{-1}$. This I(He) value is 21 cm^{-1} higher than a revised theoretical value (Chandrasekhar, Elbert and Herzberg, Phys. Rev. 91, 1953: 1172). An attempt is now being made to compare the He line with certain C^+ lines obtained in the same order of the diffraction grating. The wave-numbers of these C^+ lines can be derived accurately from near ultra-violet C^+ lines by the combination principle. In this way, it is hoped to obtain a still more precise value for I(He) which is free from any doubt introduced by the method of overlapping orders.

39. High Resolution Raman Spectroscopy of Gases. By B. P. Stoicheff, Presented by G. Herzberg, F.R.S.C.

A mirror-type Raman tube illuminated by high-current mercury lamps of new design, and completely enclosed in a reflector of magnesium oxide, has been used to obtain Raman spectra of gases with a 21 ft. grating spectrograph. Rotational spectra of gases at atmospheric pressure have been photographed in 3 to 24 hr, with a dispersion of $7\text{ cm}^{-1}/\text{mm}$ and a resolving power approaching 100,000. The rotational spectra of several diatomic and polyatomic molecules (H_2 , N_2 , C_2H_6 , C_2N_2 , C_3H_4) have been obtained under these conditions. The analysis of the rotational structure has led to the evaluation of moments of inertia, internuclear distances, and valence angles.

Section III, Tues. a.m., Spect. & Astrophys.

40. Nuclear Moments of Ca⁴³. By F. M. Kelly, H. Kuhn, and Anne Pery. Presented by A. N. Campbell, F.R.S.C.

The spectrum of calcium from a sample enriched in the isotope 43 was excited in a hollow cathode discharge. The arc line $\lambda 6103$ ($4s4p^2P_0 - 4s5s^2S_1$) and the spark lines $\lambda 3933$ and $\lambda 3968$ ($4s^2S_{\frac{1}{2}} - 4s^2P_{3/2, \frac{1}{2}}$) were studied and hyperfine structures resolved with a Fabry-Perot interferometer. The source was cooled with liquid hydrogen. The structures show that the nuclear spin is $7/2$ and that the nuclear magnetic moment is -1.2 n.m.

The work described in this report was done at The Clarendon Laboratory, Oxford.

41. Luminosity Classification of Stars from Spectrograms of Lower Dispersion. By Barbara R. Creeper. Presented by Helen S. Hogg, F.R.S.C.

One thousand stars, whose spectrograms have been obtained at the David Dunlap Observatory, have been classified for both spectral type and luminosity. The classification was made on the so-called MK system. These are stars whose radial velocities have recently been investigated. The spectrograms have dispersion of 66 Å./mm. at H_γ . This is a different dispersion than previous investigators have used for classification, but the results show that it can be used very successfully. The data for these stars now include accurate classifications, proper motions, and radial velocities. These data comprise important material for statistical studies. The classifications will be published soon, along with the radial velocities.

42. The First Spectrographic Binary in the Pleiades. By Joseph A. Pearce, F.R.S.C.

The spectrographic orbit and dimensions of H.D. 23642, the first spectrographic binary to be definitely established in the *Pleiades* cluster, were computed from the measures of twenty-one single-prism spectrograms of this double-lined star.

The elements are: $P = 2.46399$ days; $e = 0$; $T_0 = \text{J.D. } 2,432,758.0700$; $V_0 = +6.8$ km/sec; $K_1 = 100.6$ km/sec; $K_2 = 148.9$ km/sec; $m_1 \sin^3 i = 2.38 \odot$ and $m_2 \sin^3 i = 1.60 \odot$; $a_1 \sin i = 3.409 \times 10^6$ km and $a_2 \sin i = 5.045 \times 10^6$ km.

The spectral types are A0 and A1, and a magnitude difference of 1.12 was determined from a spectrophotometric analysis of six selected plates. Absolute magnitudes of $+0.52$ and $+1.64$ for the components were deduced from the measured equivalent widths of H_γ on six plates. The mass-luminosity relationship indicates an inclination of 67° for the orbital plane, and computed masses of $3.0 \odot$ and $2.0 \odot$, respectively.

The parallax of the star, and hence that of the cluster, was computed to be $\pi = 0''.007$, or 140 parsecs.

43. Spectra of the Cool Carbon Stars in the $\lambda 9,000$ – $11,000$ Wave-length Region. By Andrew McKellar, F.R.S.C.

The recent marked increase in sensitivity of Kodak spectrographic emulsion, type IZ, has made it practicable to photograph stellar spectra in the region between the strong atmospheric water-vapour bands, $\lambda 9000$ and $\lambda 11300$. Slit spectrograms of a number of stars have been obtained with the Victoria stellar spectrograph in its three-prism form, dispersion at $\lambda 10500$ about 140 Å per mm. The spectra of the cool carbon stars in this region, characterized by numerous absorption features, and in particular the four heads of the 0,0 band of the red CN system ($\lambda \lambda 10879, 10933, 10970$, and 11009) are described.

44. Flash Spectrum Intensities Determined from Observations Made at the 1930 Solar Eclipse. By K. O. Wright and S. A. Mitchell. Presented by R. M. Petrie, F.R.S.C.

Flash spectra obtained by Mitchell at the 1930 solar eclipse were calibrated with a tube photometer. The spectra have been studied in the region $\lambda\lambda 3400-5700$ and relative intensities of numerous lines have been determined for several "heights" in the solar atmosphere. The data for FeI and TiII have been analysed, using curve-of-growth methods, to obtain temperatures in the chromosphere. A correlation has been found between the measured intensities and the "heights" estimated by Mitchell, from the lengths of the arcs of the different lines observed in the flash spectra.

45. On the Development of the FeI Chromospheric Lines during Ingress of the 1951 Eclipse of 31 Cygni. By Anne B. Underhill. Presented by R. M. Petrie, F.R.S.C.

The shapes and strengths of some chromospheric FeI lines, which first appear in the spectrum of 31 Cygni about twelve days before totality, are derived from high-dispersion spectra. These lines rapidly gain in strength as totality approaches but they are not appreciably broadened by turbulence. It is shown that about six days before totality the light of the star begins to traverse a significantly denser region of the K-type atmosphere than any traversed to this time and that at this phase the B star begins to be dimmed by continuous absorption in the K-type atmosphere.

46. A Strictly Linear Coupling Circuit for High-Impedance Sources. By P. E. Argye. Presented by R. M. Petrie, F.R.S.C.

A circuit suitable for coupling a high-impedance source, such as a photocell, to a strip-chart recorder, is described. The circuit acts to cancel the source potential, has constant input impedance, and is strictly linear under all conditions of operation.

47. Spectrographic Results for the β -Cephei Star, H.D. 199140. By R. M. Petrie, F.R.S.C.

Spectrographic observations of this short-period variable have been continued for more than twenty-five years. Radial velocity, spectral type, and spectral line shape vary continuously over a period of $4^h 50^m$. The light also varies with the same period. The period is increasing uniformly at the rate of 3.7 seconds/century and the range in radial velocity is increasing 1.4 km/sec annually.

An analysis of the observed velocities, considered as radial pulsation, shows that the energy change in the radiation is much more than that in the atmospheric motions. It is shown, also, that the radiant-energy changes are sufficient to produce the observed accelerations of the atmospheric gases. It is concluded that the light variation is the more fundamental phenomenon requiring explanation.

2.00 p.m.—Sub-section CHEMISTRY, Room 219, Science Building.
PAPERS 48-57.

48. The System Lithium Sulphate-Ammonium Sulphate-Water. By A. N. Campbell, F.R.S.C., W. J. G. McCulloch, and E. M. Kartzmark.

The binary eutectics: $\text{Li}_2\text{SO}_4\text{-H}_2\text{O-ice}$ and $(\text{NH}_4)_2\text{SO}_4\text{-ice}$, as well as the ternary eutectics: $\text{Li}_2\text{SO}_4\text{-H}_2\text{O-Li}_2\text{SO}_4$, $(\text{NH}_4)_2\text{SO}_4\text{-ice}$ and $(\text{NH}_4)_2\text{SO}_4\text{-Li}_2\text{SO}_4$, $(\text{NH}_4)_2\text{SO}_4\text{-ice}$, have been determined as to temperature and composition. The complete solubility isotherms at 0.1° ,

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71.8°, and 95.2°C have been investigated. The enthalpies of solution of lithium sulphate monohydrate, of ammonium sulphate and of double salt, in water at room temperature, have been determined and from these data, as well as from the solubility isotherms, it has been shown that the temperature of transition of the double salt, $\text{Li}_2\text{SO}_4 \cdot (\text{NH}_4)_2\text{SO}_4$, to its component single salts (in the presence of water) is approached by lowering the temperature, but this transition temperature is still far from reached when the system freezes completely.

49. Improved Organic Phosphors. By B. L. Funt, R. W. Pringle, and W. Turchinets. Presented by A. N. Campbell, F.R.S.C.

Recent developments have made possible the formulation of liquid and plastic scintillators of high light output and possessing relatively large detection volumes. A systematic study has been made of the effects of primary solute, wave-length shifter, quencher, and solvent on the relative light output of the better liquid scintillators, and the significance of the results will be discussed. A similar study has been directed towards discovering the most suitable polymeric or plastic scintillators. The additional problems involved in the production of large, optically perfect castings will be indicated. The theoretical considerations underlying the light emission process in liquid and plastic scintillators will be compared and reviewed.

50. The Conductances of Strong Aqueous Solutions of Salts at Temperatures above the Melting Points of the Anhydrous Salts. By A. N. Campbell, F.R.S.C., E. M. Kartzmark, M. E. Bednas, and J. T. Herron.

The electrical conductances of aqueous solutions of silver nitrate varying in strength from 0.1 molar to that of the anhydrous molten state have been determined, at a temperature of 220°C. Similar measurements have been made on ammonium nitrate, at 180°C. The technique of the work is described and the form of the curve representing equivalent conductance as a function of concentration is discussed.

51. Chemical Effects of the $\text{C}^{12}(\gamma, n)\text{C}^{11}$ Reaction in Sodium Carbonate. By L. J. Sharman and K. J. McCallum. Presented by J. W. T. Spinks, F.R.S.C.

Anhydrous sodium carbonate has been irradiated with high energy gamma rays from a betatron. The chemical fate of the C^{11} atoms produced by the $\text{C}^{12}(\gamma, n)\text{C}^{11}$ reaction has been investigated by dissolving the irradiated material in water, and determining the compounds in which the C^{11} appears. Radioactive compounds which have been separated from the solution include oxalic, glyoxylic, and glycollic acids, as well as smaller amounts of carbonate, carbon monoxide, and formic acid. The effect of heating the irradiated crystals before solution is to decrease the amounts of the two-carbon compounds and to increase the amount of radioactive carbonate.

52. A Study, Using Radioactive Tracer Techniques, of the Hydrolysis and Hydration of Tricalcium Silicate and Betadicalcium Silicate. By W. A. G. Graham, F. W. Birss, J. W. T. Spinks, F.R.S.C., and T. Thorvaldson, F.R.S.C.

By using Ca^{45} as a tracer, evidence as to the lime : silica ratio of the solid hydration products of tricalcium silicate and beta-dicalcium silicate may be obtained without carrying the hydration to completion. The calculations required and some experimental data are presented.

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53. Intermittent Irradiation Studies Using Cobalt Gamma Rays. By R. W. Hummel, G. R. Freeman, A. B. Van Cleave, and J. W. T. Spinks, F.R.S.C.

Intermittent irradiation has been extensively used in photochemistry to determine the average free radical chain lifetime for certain reactions. The same principle has been applied to reactions initiated by gamma rays. Intermittent irradiation was achieved by rotating a slotted steel cylinder between a 1000 curie cobalt source and the samples to be irradiated. Average free radical chain lifetimes of 0.1 sec. and 1 sec. were observed for solutions of chloral hydrate and chloroform, respectively.

54. Further Experiments on the Photolysis of Acetone. By P. Ausloos and E. W. R. Steacie, F.R.S.C.

Further experiments on the photolysis of acetone are reported. It is now possible to explain the anomalous behaviour at low temperatures. Experiments at low pressures (down to 10^{-3} mm or less) give further information on the rate of recombination of methyl radicals.

55. Isotope Effects in the Combustion of Carbon Monoxide. By R. W. Attree, F. Brown, G. E. Dunn, and M. Lounsbury. Presented by G. C. Laurence, F.R.S.C.

The relative rates of combustion of $C^{18}O$, $C^{14}O$, and $C^{16}O$ in oxygen have been studied. When oxidation proceeds by the heterogeneous mechanism on the walls of the silica vessel a distinct isotope effect is produced, the heavier molecules reacting more slowly. When oxidation proceeds by means of a homogeneous explosion there is no observable isotope effect. These results are discussed in terms of the Eyring theory of rate processes.

56. The Interpretation of "Rotational Temperatures" of the OH Radical. By P. J. Dyne. Presented by G. C. Laurence, F.R.S.C.

The experimental requirements for the determination of a true rotational temperature from the relative intensities of rotational lines in a band are defined with particular reference to the ultra-violet bands of OH as excited in the spectra of flames. The significance of the f -value (absolute intensity) of these bands and of the line width is emphasized. The probable values of these parameters are such that the apparent rotational temperatures of OH cannot always be simply interpreted.

57. The Infra-Red Spectrum of Trimethylamine Oxide and the Properties of the Co-ordinate Bond. By Paul A. Giguère and K. B. Harvey. Presented by Cyrias Ouellet, F.R.S.C. (By title.)

Contradictory results have been reported previously for the length of the N-O bond in trimethylamine oxide, $(CH_3)_3NO$. This molecule provides a test of the theory according to which the length of a co-ordinate bond should not be appreciably affected by the formal charges on the two bonded atoms. The infra-red spectrum of the solid, mullied in Nujol, was measured between 3 and 15μ . By comparison with the spectrum of trimethylamine a strong band at 943 cm^{-1} was assigned to the N-O vibration in the oxide molecule. This frequency is very close to that of the N-O bond in hydroxylamine, NH_2OH , (926 cm^{-1}) thereby confirming the predictions of the theory. Badger's rule leads to a value of 1.46 \AA for the N-O distance in both molecules.

Section III, Tues. p.m., Gen. Phys.

2.00 p.m.—Sub-section GENERAL PHYSICS, Room 107, Science Building. PAPERS 58-71.

58. Kinetic Friction on Ice at High Loading. By C. D. Niven, F.R.S.C.

Large departures from Amontons' Law have been found for stainless steel, bakelite, and teflon sliding on ice, when the load was 25 to 50 kg. per sq. cm. of apparent contact surface. At temperatures just under 32°F. the drag became practically independent of the load, if this was heavy enough.

59. Polarization and Double-Doppler Investigations of the Radio Echoes from Aurora. By A. G. McNamara. Presented by B. W. Currie, F.R.S.C.

Polarization investigations at Saskatoon, Canada, of the VHF echoes from aurora show that 56-Mc/s signals that are transmitted horizontally polarized are almost completely depolarized on reflection. The echoes are received on two identical antennas, one polarized horizontally and the other vertically. The power of the vertically polarized component on the average is 3 db. below that of the horizontally polarized component. The histogram of the polarization ratios exhibits a mode which is near unity.

Double-Doppler radar at a frequency of 90.7 Mc/s has been employed to examine the modulation produced by auroral reflection. The spectrum, corresponding to Doppler shifts between 50 and 250 c.p.s., consists of a continuous background upon which is superimposed signals due to the apparent displacement of the auroral ionization. Simultaneous observations with ordinary pulsed radars (56 and 106.5 Mc/s) permit correlation with the observed displacements and the ranges of the reflecting centres.

60. The Location and Shape of the Auroral Zone. By J. H. Meek. Presented by B. W. Currie, F.R.S.C.

It is proposed that the auroral zone takes the form of two opposing "Stormer type" spirals, one due to positive particle precipitation and the other due to negative particle precipitation. These spirals intersect each other at a high latitude at about 10 A.M. and at a lower latitude at about 10 P.M. local time, and move around the earth with the sun. Their latitude range varies from disturbance to disturbance. If particle precipitation is responsible for both auroral light, and ionospheric currents, such as would produce the observed variations in the earth's magnetic field, it is concluded that most auroral light occurs along the positive precipitation spiral. Martyn's recent theory of the aurora, which is oversimplified, can be adapted to fit this proposal.

61. A Method for the Accurate Measurement of the Noise Temperature Ratio of Silicon Crystals. By R. E. Davis and R. C. Dearle, F.R.S.C.

A network known as the Roberts line is commonly used in obtaining approximate values of the noise temperature ratio, "t," of crystals. It will be shown that a more detailed analysis than that generally presented reveals certain sources of error that were not previously apparent, and that these errors may be eliminated for all practical purposes by the use of cathode lead inductance in the amplifier. It will then be shown that once these errors are eliminated, the crystal conductance may be determined simply and accurately, providing an accurate determination of "t" with little loss in the simplicity of measurement.

62. Noise in Travelling Wave Tubes. By A. G. Mungall. Presented by G. A. Woonton, F.R.S.C.

The dependence of the noise figure of 3.2 cm travelling wave tubes on gas pressure, degree of space charge existing in the electron gun, and on the separation between the gun anode and the circuit entrance of the tube, has been investigated in detail. A theory has been developed to explain the latter two which gives better agreement with experiment than do existing theories. A new and effective method of noise figure reduction by the use of a triode gun has been devised, and a partial theoretical explanation of it is suggested.

63. Bifurcation of a Rectangular Waveguide. By R. A. Hurd and H. Gruenberg. Presented by D. W. R. McKinley, F.R.S.C.

A rigorous solution has been obtained to the problem of a bifurcated rectangular waveguide. The method used runs as follows: The fields in the main guide and in the branch guides are expanded in terms of waveguide modes. The tangential field components are matched at the interface. This leads to infinite sets of linear equations which are solved rigorously by means of Cauchy's residue theorem.

This problem has been solved previously by Wiener-Hopf techniques. The method used here is more direct and requires less comprehensive knowledge of the complex integral calculus.

64. A Cavity Method of Measurement of Power at Ultra High Frequencies
By Surindra N. Kalra. Presented by J. T. Henderson, F.R.S.C.

A short-circuited loop of wire is placed in a coaxial resonant cavity. The forces on the loop, which may be radial or torsional, are calculated in terms of the dimensions, power input, and the quality factor, Q , of the cavity. Some of the factors influencing the accuracy of measurement are considered. Experimental observations of these forces are discussed. This method suggests a means of determining power at U.H.F. on an absolute basis.

65. Investigation of Very Monochromatic Spectral Lines for the New Standard of Length. By K. M. Baird. Presented by L. E. Howlett, F.R.S.C.

New apparatus for very precise wave-length comparison is described. The apparatus makes use of photoelectric scanning to determine the order of interference in a Fabry-Perot etalon. As results can be obtained very quickly, the method is particularly suited to determining the effect of lamp conditions on emitted wave-lengths. Preliminary results of an investigation of the lines of Hg 198 and Kr 86 are given.

66. A New Type of Interferometer. By K. M. Baird. Presented by L. E. Howlett, F.R.S.C.

An interferometer is described in which light is passed through a pair of approximately parallel, partially silvered glass plates and is then returned by various forms of reflector so as to pass through a different part of the same plates. The properties of the fringes are discussed and it is shown how the interferometer can be applied to such problems as the measurement of refractive index of gases and the very precise measurement of small angles.

67. The Conductivity of Polar Dielectrics. By John Hart. Presented by J. T. Henderson, F.R.S.C.

A small resistive current flows between two d.c. electrodes immersed in a polar liquid; the liquid at the same time suffers a large increase in viscosity. The current falls over a period of about one hour to a steady low value, and the viscosity returns to normal. No satisfactory explanation has yet been given for these effects, and experimental results are presented which suggest that there exists a combination of electrode polarization and the transfer of momentum by ions.

If the frequency of the applied field is increased from zero to about 2 kc/s, the viscosity-frequency curve may exhibit a series of peaks; the position and amplitude of each peak is dependent upon the rate of flow of the liquid past the electrodes. The signification of this observation is discussed briefly.

68. The Absolute Measurement of the Acceleration due to Gravity at Ottawa. By L. G. Turnbull, E. Green. Presented by L. E. Howlett, F.R.S.C.

A metal bar, 2 metres long, bears seven transparent scales, spaced such that as the bar falls (usually *in vacuo*) the scales pass the axis of a camera, in synchronization with a spark light-source, flashing ten times per second. The rule is released magnetically with a controlled time delay (for synchronization), is arrested in a dash-pot mechanism, and can be reset without breaking the vacuum seals. The spacing between the scales is calibrated in terms of the International metre, and the time interval between flashes is found by photographing oscilloscope traces associated with the spark-flash and a standard frequency signal.

69. Jet Streams in the Atmosphere. By D. P. McIntyre. Presented by Andrew Thomson, F.R.S.C.

This paper describes recent work based on cross-sections through the atmosphere, most of which were produced by statistical methods. The studies were designed to provide information on the structure and behaviour of jet streams (narrow, high-velocity, streams of air) in the upper atmosphere over North America and western Europe. It is shown that jet streams occur at nearly all latitudes from the tropics to the arctic regions. They are closely related to the tropospheric temperature field and to the three major frontal surfaces of the Northern Hemisphere. The cores of these high velocity winds tend to move gradually southward during their life histories. Some implications of these findings are briefly discussed.

70. A Theoretical Approach to the Calculation of Seismic Wave-Velocity in Sedimentary Formations. By N. R. Paterson. Presented by J. T. Wilson, F.R.S.C.

Experience has shown that the velocity of seismic waves in sedimentary strata is controlled chiefly by depth. It is proposed that all other factors affecting the velocity may be included in a "lithological parameter" which involves only the density, distribution, and elastic properties of the grains, the porosity and the nature of the pore-filling material.

Theoretical wave-velocities have been calculated for simple packings of elastic spheres and models of these are being studied in the laboratory.

The theory enables us to predict the velocities in geological formations and these appear to be in fair agreement with those measured in the field.

71. Laboratory Experiments on the Head Wave at the Plane Interface of Two Elastic Media. By P. N. S. O'Brien. Presented by J. T. Wilson, F.R.S.C.

A large wax block is held at the bottom of a tank of water so that the water level is well above the surface of the wax. Two Rochelle salt transducers are placed in the water; one is activated by a pulse generator and acts as an acoustic source, the other is used to detect the resultant acoustic field at different points in the water. In particular the head waves which travel along the interface with a velocity characteristic of the lower medium are observed.

Wednesday, June 2

- 9.00 a.m.**—Sub-section SOLID STATE and GENERAL PHYSICS, Room 107, Science Building. PAPERS 72–85.

72. Geophysical Investigation of a Possible Meteorite Crater near Brent, Ontario. By M. J. S. Innes, P. L. Willmore, and Jack Clark. Presented by C. S. Beals, F.R.S.C.

Investigations made in the vicinity of a circular topographic depression, two miles in diameter, appearing on aerial photographs, support the theory of a meteoric origin. The depressed area is nearly filled with heavy glacial deposits and there is some evidence that these deposits are underlain by Paleozoic sediments. The gravity results show a circular minimum of 5 milligals, provide an estimate of 1,500 to 3,600 feet for the depth to the undisturbed floor, and are inconsistent with a volcanic origin for the feature. Seismic evidence from shots fired at intervals along a diameter indicate a maximum of 1,000 feet of low velocity material, believed to be Paleozoic sediments. The vertical magnetic anomalies are small and vary uniformly over the centre of the crater suggesting a deep-seated origin.

73. A Contour Study of the Ungava Crater. By P. M. Millman. Presented by C. S. Beals, F.R.S.C.

Photographs of the Ungava Crater by the R.C.A.F., made in 1953, were used by the Topographical Survey of the Department of Mines and Technical Surveys to produce a contour map centred on the crater, of area 10 by 12 miles, scale 4 inches to the mile, with contour intervals of 25 feet. Mean crater profiles determined from this map have been compared with terrestrial meteor craters and well-observed lunar craters. These comparisons support the theory of the meteoric origin of the Ungava Crater.

74. The Effect of Acoustic Loading on the Vibration Patterns of Barium Titanate and Quartz Discs. By R. J. Sujir and E. A. G. Shaw. Presented by L. E. Howlett, F.R.S.C.

In previous work, the normal surface displacement patterns of thick barium titanate discs vibrating in various normal modes have been obtained using multiple beam optical interference. This technique has now been used to determine the effect of loading the disc with a liquid in contact with one plane surface. It is found that the discrete modes observed with an unloaded disc begin to merge so that the vibration patterns show a continuous transition with changing frequency as one passes from one mode to the next in the "thickness resonance" region. The results of similar studies with a quartz disc will also be presented.

Section III, Wed. a.m., Solid State & Gen. Phys.

75. Effective Ear Defenders for Protection from Noise. By E. A. G. Shaw and G. J. Thiessen. Presented by L. E. Howlett, F.R.S.C.

Present ear defenders of the cover type generally have too low an attenuation at the lower frequencies (50 to 500 c.p.s.). This results from a compromise that has to be made between two design requirements that are contradictory with customary cushions. A *soft* cushion is required to provide an adequate seal with an irregular shaped head while a *hard* cushion is required to adequately support the cup. This contradiction is resolved in the new design resulting in a low frequency attenuation as high as 34 db. when a rigid plate is substituted for the head. Its performance *in situ* is limited by the compliance of the skin and flesh on the head.

76. Acoustic Irritation Threshold of Peking Ducks and Ring-billed Gulls. By G. J. Thiessen and E. A. G. Shaw. Presented by L. E. Howlett, F.R.S.C.

Moving pictures will be shown of some characteristic reactions of peking ducks and ring-billed gulls showing their irritation by high intensity sounds. These reactions are used to define an acoustic irritation threshold which has been measured as a function of frequency. The minimum average threshold for about 30 ducks is between 70 db. and 75 db. and occurs at 500 c.p.s. The corresponding value for six-month-old gulls is 85 db. and occurs at roughly the same frequency. The threshold for gulls, however, appears to vary with time. It is not known whether this is a seasonal effect or an age effect.

77. A Comparison of Radiation Forces Acting on a Sphere in Spherical and Cylindrical Sound Fields. By T. F. W. Embleton and G. J. Thiessen. Presented by L. E. Howlett, F.R.S.C.

A theoretical and experimental determination has previously been described (J. Acoust. Soc. Amer. 26, 1954: 40) of the mean forces acting on a spherical obstacle placed in a progressive spherical sound field. Quantitative verification was obtained using a series of hollow glass spheres (0.22 to 3.03 cm. radius) suspended in a sound field in air: the forces on each sphere were measured at known frequencies (300 to 7000 c/s) and intensities of the sound field. Experimental results have now been obtained in a progressive cylindrical sound field. In both types of sound field it was found that, as the source of the field was approached, the radiation force of repulsion decreased to zero and then became a force of attraction. The distance to which this region of attraction extended from the source was determined both by the frequency of the field and by the size of the detecting sphere—lower frequencies and smaller spheres both extended the region.

78. A Resistance-Type Crystal-growing Furnace. By J. A. Powell and J. H. Simpson. Presented by D. W. R. McKinley, F.R.S.C.

A furnace for growing single crystals of germanium by the Czochralski technique of pulling from the melt is described. The device operates satisfactorily up to temperatures of 1100°C and holds the temperature within $\pm 0.25^\circ$ of the set value during the pulling process. The circuit consists of a thermocouple and chopper type a.c. amplifier which controls the field of a small d.c. generator supplying the heater. The amplifier incorporates an anticipation circuit which compensates for the time lag of the furnace and is essential to maintain the temperature within the limits mentioned above. Single crystals 1.5 cm in diameter and 3 cm long have been grown and the device may be readily applied in the production of considerably larger crystals if necessary.

79. Nuclear Resonance Absorption of B^{11} in Kernite. By N. G. Cranna and H. Waterman. Presented by G. M. Volkoff, F.R.S.C. (By Title).

Eleven magnetic resonance absorption lines of B^{11} in a single crystal of kernite ($Na_2B_4O_7 \cdot 4H_2O$) have been observed in a magnetic field of 7000 gauss. The dependence of these resonance frequencies on crystal orientation indicates the existence of four non-equivalent boron positions in a unit cell, and leads to a tentative estimate of the pure quadrupole frequency at one of these four positions of 1330 ± 80 kc/sec. A pure quadrupole line consistent with this "high-field" estimate has been experimentally found in zero field at 1270 ± 20 kc/sec. by means of a super-regenerative detector.

80. Magnetic Susceptibility Measurements at Low Temperatures. By D. H. Rogers and W. B. Pearson. Presented by G. Herzberg, F.R.S.C.

In view of anomalies observed previously in resistive and thermoelectric properties of the alkali metals (cf., e.g., D. K. C. MacDonald, *Phil. Mag.* 43, 1952: 479; D. K. C. MacDonald and W. B. Pearson, *Proc. Roy. Soc. A221*, 1954: 534-540) measurements of magnetic susceptibility of all the alkali metals (Li, Na, K, Rb, Cs) are being made. The temperature range being covered is that from liquid helium to room temperature.

The same apparatus is also being applied for magnetic studies of copper alloys and sigma phases up to $\sim 1000^\circ C$.

81. Statistical Thermodynamics and Vibrational Anharmonicity of a Linear Chain. By J. S. Dugdale and D. K. C. MacDonald. Presented by G. Herzberg, F.R.S.C.

An investigation of the classical statistical thermodynamics of a linear chain of atoms interacting through a Morse or an arbitrary potential is now complete. It is found, in particular, that a relatively sharp transition to a quasi-gaseous "phase" is exhibited and that the specific heat at constant length in the "condensed phase" falls with increasing temperature. The influence of next-nearest neighbour is also discussed and the behaviour in the high-pressure region determined.

82. The Influence of Zero-Point Energy on the Thermodynamic Properties of the Low Boiling-Point Elements. By J. S. Dugdale and D. K. C. MacDonald. Presented by G. Herzberg, F.R.S.C.

The internal energy and molar volume at absolute zero and the characteristic (Debye) temperature of the inert gas solids (Xe, Kr, Ar, Ne, He) together with hydrogen and deuterium have been calculated taking account of the zero-point energy. It has been shown that the influence of zero-point energy is, to a good approximation, simply to modify the attractive term in the intermolecular potential. A law of corresponding states in the solid phase is therefore to be expected and the consequences of this are discussed with particular reference to melting. This study is related to experimental work at present in progress in our laboratories on the melting curves at high pressures of the hydrogen isotopes and the heavier inert gases.

83. Specific Heats of the Alkali Metals. By T. M. Dauphinee and H. Preston-Thomas. Presented by G. Herzberg, F.R.S.C.

A semi-automatic apparatus for measuring specific heats (T. M. Dauphinee, D. K. C. MacDonald, and H. Preston-Thomas, *Proc. Roy. Soc. A221*, 1954: 267) has been developed as part of an investigation of anomalies previously observed in the alkali metals (cf. abstract

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number 80 by D. H. Rogers and W. B. Pearson, presented at this meeting). Measurements on sodium showing a specific heat anomaly have already been reported (*loc. cit.*). Rubidium shows a similar but more pronounced anomaly in the temperature range 100°K to 200°K. The anomaly can be progressively removed by extended heating above the melting point, but an explanation of its high total energy has yet to be discovered. The latent heat of fusion of rubidium, which has not previously been measured, was found to be 560 cal/mole. Experiments on potassium are under way.

84. Dispersion of Acoustic Waves in the Alkali and Noble Metals. By A. B. Bhatia. Presented by D. C. Rose, F.R.S.C.

In deriving the secular equations determining the frequencies of the normal modes of vibrations in a crystal, one usually assumes that the forces on the ions (atoms) are completely describable by an interaction potential function between the ions. This assumption, which can be made for ionic and homovalent crystals, is *unrealistic* for metals where the interaction between the electrons and the ions is of decisive importance. The secular equations for the alkali and noble metals are derived here by assuming that the force on an ion arises from (i) a short-range interaction potential $V(r)$ between the ions and (ii) the ion-ion and electron-electron repulsion and the ion-electron interaction. The effect of (ii) on ionic motions is obtained by assuming the Sommerfeld model for a metal and applying the Thomas-Fermi-Dirac method to calculate the change ϕ in the electrostatic potential due to a given displacement of the ions. The corresponding force on an ion is $-\rho \text{ grad } \phi$.

The secular equations, so derived, contain three unknown constants which can be related to the elastic constants by comparing these equations for the limiting case of long waves with the Christoffel equations of the elasticity theory. Further, a certain linear combination of the elastic constants is found to depend essentially on the number n of free electrons in the metal. Since $n \sim 1$ per atom for the alkali and noble metals, a comparison between experimental and theoretical values of this elastic constant provides a check on the reasonableness of our assumptions. The agreement is good for Ag and Na, but poor for other metals.

85. A Quantum Mechanical Definition of Refractive Index. By S. M. Neamtan. Presented by A. N. Campbell, F.R.S.C.

A definition of the dielectric constant subject to certain restrictive conditions which was formerly proposed by Neamtan (Phys. Rev. 92: 1362) is shown, when considered as defining the square of the refractive index, to be of much greater generality than was at first apparent. The electromagnetic field and the particles of a refractive medium are considered as forming a single system, S . First-order transitions can be induced in S which are interpretable as corresponding to the emission of a photon in the medium, the change in momentum of S being precisely equal to the momentum of the associated photon. The refractive index is defined as $c|\Delta P/\Delta W|$, where ΔP and ΔW are respectively the change in momentum and change in energy of S in such a transition.

9.00 a.m.—Sub-section NUCLEAR PHYSICS, Room 219, Science Building. PAPERS 86-96.

86. The Relativistic Increase in Ionization. By E. Pickup. Presented by D. C. Rose, F.R.S.C.

Ilford G5 photographic emulsions have been exposed to mono-energetic beams of pi-mesons from the Brookhaven cosmotron. Using these mesons (recognized as pi-mesons because they produce stars in the emulsions) and gamma-ray electron pairs and knock-on electrons accompanying the meson beam, the relativistic increase in ionization has been measured accurately. The nature of the approach to a plateau value of ionization beyond the mini-

mum, and the extent of the increase, have been definitely established under given experimental conditions. The results and their comparison with theoretical expectations will be discussed.

87. Properties and Prospects of a New Fine-Grain Nuclear Emulsion Made in the Laboratory, Sensitive to Minimum Ionization. By Pierre Demers, F.R.S.C.

In these emulsions, minimum ionization tracks show 15 grains per 100 microns, with a grain diameter estimated as 0.15μ . Distortion is small, and it is shown that the error in scattering measurements arising from track structure is less in this than in commercial emulsions. This emulsion is suited for a simultaneous study of high energy tracks and of low energy nucleonic branches.

88. Angular Correlation Studies. By H. W. Taylor. Presented by A. N. Campbell, F.R.S.C.

A coincidence spectrometer employing differential discriminators for pulse height analysis has been constructed for the study of angular correlations between successive γ -rays. The angular correlation functions for the principal cascades in the decay schemes of several radioisotopes will be discussed.

89. On the Decay of the χ Meson. By Seiichi Suekoa. Presented by D. C. Rose, F.R.S.C.

At the Cosmic Ray Congress held at Bagnères in France (June, 1953) it was proposed that the χ -meson and the κ -meson should be considered as identical with the τ -meson but having alternative modes of decay, namely, the χ -mode and the κ -mode of decay of τ given by

$$\tau^{\pm} \xrightarrow{(\chi)} \pi^{\pm} + \left\{ \begin{array}{l} \gamma \\ \pi^0 \end{array} \right., \quad \tau^{\pm} \xrightarrow{(\kappa)} \mu^{\pm} + \nu^0 + \left\{ \begin{array}{l} \gamma \\ \pi^0 \end{array} \right.$$

(See, for instance, the report of the Congress by L. Leprince-Ringuet, Review of Nuclear Science, 3, 1953.) These modes of decay are obviously consistent with the decay scheme

$$\tau^{\pm} \rightarrow \pi^{\pm} + \pi^{+} + \pi^{-}$$

But we would like to point out the impossibility of the χ -mode decay $\tau^{\pm}(\chi^{\pm}) \rightarrow \pi^{\pm} + \pi^0$, if we take into account the selection rules based on charge conjugation and charge symmetry (L. Michel, Nuovo Cimento 10, 1953: 319). That is, the decay scheme $\tau^{\pm} \rightarrow \pi^{\pm} + \pi^{+} + \pi^{-}$ is possible only if τ is a pseudovector meson having pseudovector coupling or is pseudoscalar. On the other hand, the scheme $\tau^{\pm}(\chi^{\pm}) \rightarrow \pi^{\pm} + \pi^0$ is possible only when π^{\pm} is a scalar or vector meson.

90. The Hyperfine Structure of Mercury Extracted from Neutron Irradiated Gold. By R. E. Bedford and A. M. Crooker. Presented by G. M. Shrum, F.R.S.C.

The hfs. of suitable lines excited in mercury extracted from several gold samples in different neutron fluxes has been photographed with a Fabry-Perot interferometer. As well as the strong lines due to Hg^{199} , weak lines are also observed for Hg^{199} owing to the Au^{198} capturing a neutron before the β -decay. For the branching ratio

$$\frac{\text{Au}^{198} \text{ (capture)}}{\text{Au}^{198} \text{ (decay)}} = \frac{\text{Hg}^{199}}{\text{Hg}^{198}} = \frac{\sigma F}{\lambda}$$

Using the measured ratio of $\text{Hg}^{199}/\text{Hg}^{198}$, $\tau = 2.69$ days, and the neutron fluxes we have determined for the Au^{198} capture cross-section, $\sigma = (1.78 \pm 0.10) \times 10^4$ barns.

91. Fine Structure in the 82 and 50 Neutron Shell Regions of the Mass-Fission Yield Curve for Thermal and Fast Neutron Fission of U^{235} and U^{238} Respectively. By R. K. Wanless and H. G. Thode, F.R.S.C.

It has been known for some time that certain xenon masses, 133, 134 (in the 82 neutron shell region) are favoured in the thermal neutron fission of U^{235} , giving rise to so-called fine structure in the mass fission yield curve.

Mass spectrometer yield determinations of the Xe and Kr isotopes made for the fast neutron fission of U^{238} show a similar fine structure in the Xe region but shifted toward the lower masses and show definite fine structure in the Kr mass region for the first time.

92. Concerning the Correctness of the Chemical Atomic Weights of the Mono-Isotopic Elements. By Henry E. Duckworth. Presented by H. G. Thode, F.R.S.C.

Twenty-two of the naturally occurring elements are monoisotopic. Their chemical atomic weights can, therefore, be calculated from a knowledge of their isotopic weights plus the conversion factor from the physical to the chemical scale. The masses of the isotopes of most of these elements are accurately known from recent mass spectrographic and transmutation studies. Furthermore, the conversion factor has recently been accurately determined. The chemical atomic weights so calculated will be compared with the accepted chemically determined values. The agreement is such that it should help to cement relations between physicists and chemists.

93. A Study of Photofission of U^{238} . By L. Katz, F.R.S.C., M. Kavanagh, A. G. W. Cameron, E. C. Baily, J. W. T. Spinks, F.R.S.C.

The photofission of U^{238} has been studied by chemically separating the fission products and measuring their beta activity to give the yields of the various mass chains. The yield curve at a given betatron operating energy E_0 exhibits the usual double-humped mass distribution. The yield of a given mass chain as a function of E_0 was analysed by methods developed in this laboratory to give the photofission cross-section leading to this mass chain as a function of photon energy. In particular, the ratio of the cross-section leading to mass chain 115 and 139 as a function of energy will be presented and discussed.

94. On Dirac's Generalized Hamiltonian Dynamics. By R. Skinner. Presented by D. C. Rose, F.R.S.C.

Dirac (Can. J. Math. 2, 1950: 129) has recently developed a Hamiltonian formalism for classical dynamical systems whose momenta-defining equations

$$p_a = \partial L(\dot{q}, q) / \partial \dot{q}_a, \quad a = 1, 2, \dots, N,$$

lead to relations between the co-ordinates q and momenta p :

$$\phi_i(p, q) = 0, \quad i = 1, 2, \dots, n \leq N.$$

We have investigated this formalism from the point of view of transformation theory. A dynamical system of the above type is characterized by an action integral

$$\int L(q, \dot{q}) dt$$

that is invariant under infinitesimal co-ordinate transformations of the form

$$(1) \quad \delta q_a = \sum_{i=1}^n (A_{a0}^i \xi_i + \dots + A_{an}^i d^a \xi_i / dt^a),$$

where ξ_i are arbitrary independent (infinitesimal) functions of t , and where A_{ar}^i are functions of the q 's and \dot{q} 's which can be calculated from the form of the ϕ 's. Co-ordinate transformations in general relativity and gauge transformations in electrodynamics provide examples of such systems. If we require the action integral to be invariant under the transformations (1) only, the Hamiltonian equations of motion can be expressed in terms of derivatives with respect to t and n other variables. These equations are non-integrable if any of the A_{ar}^i are non-zero for $r \neq 0$. However, a certain group of co-ordinate transformations larger than (1) generates from $\int L dt$ an action integral which corresponds to integrable systems.

95. The Gamma Rays from Copper 67 and Nickel 66. By N. E. Booth and D. T. Roberts. Presented by B. W. Sargent, F.R.S.C. (By title.)

Radioactively-pure Cu⁶⁷ and Ni⁶⁶ have been chemically separated from zinc following its irradiation with 70-Mev. bremsstrahlung from the synchrotron at Queen's University. The gamma rays were studied with a NaI scintillation spectrometer. The gamma rays following the decay of Cu⁶⁷ have energies of 98 ± 4 kev. and 186 ± 4 kev. and estimated relative intensities of 22 per cent and 78 per cent respectively. Ni⁶⁶ emits no gamma rays with energies between 0.24 and 3.0 Mev. and intensities greater than 1 per cent. The energy of the gamma ray from the Cu⁶⁶ daughter was found to be 1.02 ± 0.05 Mev.

96. Nuclear Many-Body Exchange Forces. By L. E. H. Trainor. Presented by B. W. Sargent, F.R.S.C. (By title.)

Wigner's uniform model, extended to include 3-body exchange forces, predicts a symmetry effect in the energy differences between neighbouring isobars of *even-odd* nuclei. The symmetry energy in an isobaric sequence depends not only upon the isotopic spin, but also upon whether the number of nucleons in the *even* group exceeds, or is less than, the number in the *odd* group. A study of beta-decay energies in the range of mass numbers $15 \leq A \leq 59$ seems to show such an effect, and indicates that 3-body exchange forces are not negligible compared to 2-body forces.

9.00 a.m.—Sub-section CHEMISTRY, Room 115, Science Building.
PAPERS 97-109.

97. Phthalide Formation. III. Condensation with 5-Hydroxy-2-Methylbenzoic Acid. By E. H. Charlesworth, E. A. Dudley, and E. F. Nishizawa. Presented by A. N. Campbell, F.R.S.C.

The condensation of 5-hydroxy-2-methylbenzoic acid with aqueous formaldehyde and hydrochloric acid yields the lactone of 8-hydroxymethyl-6-methyl-1,3-benzodioxan-7-carboxylic acid. Proof of the presence of the *m*-dioxane and phthalide rings in the condensation product has been obtained by opening these rings in succession. In both cases this has led by a series of degradative steps to 4-methoxybenzene-1,2,3,5-tetracarboxylic acid. The structure of this acid has been confirmed by its synthesis in six unambiguous steps from mesitylene. No depression of melting point on mixing proves the identity of the two samples.

Section III, Wed. a.m., Chemistry

98. On the Existence of Ketene-Imine Linkages in the Polymethacrylonitrile Macromolecules. By M. Talât-Erben and S. Bywater. Presented by I. E. Puddington, F.R.S.C.

Previous work by the present authors has shown that 2-cyano-2-propyl radicals are mesomeric and dimerize yielding: (1) the usual dimer, and (2) a ketene-imine (—C= C=N—). In the polymerization of α -methylacrylonitrile, the active end of a growing chain having the same structure as the 2-cyano-2-propyl radical, some of the linkages in a polymethacrylonitrile chain are expected to consist of ketene-imine groups. An I.R. spectrophotometric investigation of polymethacrylonitriles has fully confirmed this prediction. The absorption due to ketene-imine groups depends on the polymerization temperature. By heating, it is possible to remove these unstable groups; in this case the polymer degrades appreciably.

99. A Chemical Study of the Peats of Quebec. V. Composition of the Peat from the Small Tea Field Bog. By C. E. Brunette and J. Risi. Presented by Paul E. Gagnon, F.R.S.C.

The following determinations were made on 26 samples from four bore holes of the Small Tea Field Peat Bog, County of Huntingdon: pH, moisture, bitumen, cellulose, hemicelluloses, lignin, humic substances, and ash. Results show that the content of bitumen decreases with depth. Hemicelluloses, cellulose, and lignin increase in the upper layers but then decrease with depth in the lower, more mineralized strata. An anomalous behaviour was found for humic substances which decrease with depth. The average content of above ingredients in this bog and the total reserve of potential raw materials for the chemical industry were calculated.

100. Resolution of the Two Racemic Hydroxylauidanosines. By Jean L. Ferron and Philibert L'Ecuyer. Presented by Paul E. Gagnon, F.R.S.C.

Racemic α -hydroxylauidanosine was treated with d-tartaric acid and the salt dB.dA was less soluble than 1B.dA and separated. It was recrystallized until pure. Treatment with alkalis liberated the pure d-base. The mother liquors containing 1B.dA and some more or less dB.dA were treated with alkali and the partially resolved base (1B + d1B) was obtained. When this was treated with racemic tartaric acid the diastereoisomer 1B.1A was less soluble than the racemic salt d1B.d1A and separated. Crystallization then yielded the 1B.1A pure salt from which alkali liberated the pure 1B.

An identical procedure yielded the two diastereoisomers of the racemic β -hydroxylauidanosine.

101. Preparation of Alkylnitroguanidines. By Paul A. Boivin, Jean L. Boivin, and John Dickson. Presented by Paul E. Gagnon, F.R.S.C.

Alkylnitroguanidines, RNH—C(NH)NHNO_2 , have been prepared by the dehydration of alkylguanidines nitrate by means of sulphuric acid. Yields up to 70 per cent were obtained. These nitrates were prepared successfully by the fusion of alkylamines nitrate with dicyandiamide or alkylamines nitrate with lime nitrogen and urea; yields varied from 65 to 92 per cent. R = C_3H_7 , isopropyl; C_4H_9 , isobutyl; C_4H_{10} , diethyl; C_5H_{11} , *n*-amyl; C_6H_5 , phenyl.

102. Certain Reduction Products of 2-Chloronitrobenzene and 2,5-Dichloronitrobenzene. By Karl F. Keirstead. Presented by Paul E. Gagnon, F.R.S.C.

The reduction of 2-chloronitrobenzene and 2,5-dichloronitrobenzene by dextrose or sodium arsenite and methyl alcohol in strong alkaline solution gives rise in small yield to certain highly coloured compounds having both acidic and basic properties. A study of derivatives as well as oxidation and reduction products suggest a phenazine structure.

103. Solvolysis of Cellulose Acetate Sulphate in Acetone. By Paul E. Gagnon, F.R.S.C., Karl F. Keirstead, Jessie Walker, and Keith Kavanaugh. Presented by Paul E. Gagnon, F.R.S.C.

Solutions of cellulose acetate sulphate in acetone and water have been studied. The rate of appearance of free sulphuric acid increases markedly as the residual water content is reduced. The sulphate content of the cellulose acetate sulphate also appears to affect the rate, a decrease in sulphate content tending to increase the rate. An increase in concentration of cellulose acetate sulphate seems to decrease the rate of appearance of free sulphuric acid.

104. Pyrolysis of Ethyl Mercaptan. By Jean L. Boivin. Presented by Paul E. Gagnon, F.R.S.C.

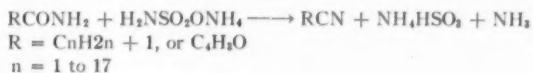
The pyrolysis of ethyl mercaptan into ethylene and hydrogen sulphide was studied. Investigation of catalysts mainly sulphides of metals (NiS, CoS, CuS, CdS and FeS) and oxides (Al_2O_3 , SiO_2 and Fe_2O_3) proved that the production of ethylene from ethyl mercaptan is very slightly catalytic over a wide range of temperature (450–800°C). With the most suitable catalysts (NiS or CoS), a temperature of 500°C was very efficient. Without catalyst, temperatures of 500 to 700°C gave a good conversion. Ethyl mercaptan has been converted into ethylene in 60 per cent yield whereas hydrogen sulphide was produced nearly quantitatively. In this pyrolysis were also formed CS_2 , CH_4 , H_2 , C_2H_4 , thiophene, diethyl sulphide, and sulphur depending on conditions employed.

105. Syntheses of Amino Acids from Carbethoxy Glycine Ester. By Paul E. Gagnon, F.R.S.C., Jean L. Boivin and Donald C. Watson.

By the condensation of carbethoxy glycine ethyl ester with benzaldehyde and *p*-hydroxybenzaldehyde, benzylidene compounds have been obtained. These were catalytically hydrogenated using platinum. The saturated products were then hydrolysed and α -amino acids were obtained in good yields. At the present time, the condensation of carbethoxy glycine ester with other aldehydes, both aliphatic and aromatic, is being studied.

106. Syntheses of Nitriles by Fusion of Amides with Ammonium Sulphamate. By Paul E. Gagnon, F.R.S.C., Jean L. Boivin, and Catherine Haggart.

The amides and ammonium sulphamate were mixed in the ratio of one to three. The mixtures were heated in a metal bath, the temperature being slowly increased from 140° to 200°C.



Section III, Wed. a.m., Chem.; Business Meeting

The periods of heating depended on the stabilities of the amide and the nitrile. The procedure also proved successful with diamides. At the present time other amides are being studied.

107. Separation of Long Chain Fatty Acids. By Paul E. Gagnon, F.R.S.C. and Yvon Laflamme.

Long chain fatty acids, capric, hendecanoic, lauric, tridecanoic, etc., have been synthesized and the separation of mixtures of these acids by distillation and partition chromatography has been studied using C^{14} tagged acids to determine the purity of the compounds.

108. Synthesis of Anthracene-1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 14- C^{14} . By Paul E. Gagnon, F.R.S.C., and Georges Sobolewski.

Attempts are now being made to synthesize anthracene labelled in all positions except 9 and 10 with C^{14} . The different syntheses described in the literature are critically examined in the laboratory.

109. Syntheses and Absorption Spectra of 2-substituted-3-Hydroxy-5-Pyrazolones. 4-n-Hexyl-5-Pyrazolones-4- C^{14} . By Paul E. Gagnon, F.R.S.C., Jean L. Boivin, Roderick MacDonald, and Leo Yaffe.

Tautomeric structures have been postulated for 2-substituted-3-hydroxy-5-pyrazolones prepared from diethyl malonates, $RCHCOOC_2H_5$, $R = H, CH_3, C_2H_5, C_3H_7, C_4H_9, C_5H_{11}, C_6H_{13}, C_6H_5CH_2$ and *o*- *m*- and *p*-chlorophenylhydrazines and *n*-hexylhydrazine on the basis of chemical properties and ultra-violet and infra-red data. When diethyl *n*-hexyl malonate-2- C^{14} was used as starting material the corresponding pyrazolones labelled with C^{14} were obtained and their specific activities determined.

11.30 a.m.—BUSINESS MEETING of the Section, Room 107, Science Building.

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SECTION IV. GEOLOGICAL SCIENCES

Monday, May 31

11.00 A.M.—Meeting of the Section.

1. Presidential Address. By T. H. Clark, F.R.S.C.

2.00 P.M.—Meeting of the Section.

2. The Eocene-Oligocene Transition as a Time of Major Orogeny in Western North America. By Loris S. Russell, F.R.S.C.

In an earlier paper it was shown that the major uplift of the eastern Rocky Mountains in the United States and Canada occurred between Early Eocene and Early Oligocene time. More recent work on the stratigraphy and palaeontology of latest Eocene and earliest Oligocene sediments of this region has shown that a greater time interval is involved in the Eocene-Oligocene transition than was previously thought. Evidently widespread orogeny has obscured the record of this interval in many places. However, in northeastern Utah the Uinta and Duchesne River formations record the uplift of the Uinta Mountains from late Eocene to earliest Oligocene time. A similar although less continuous record occurs in the Wind River basin of Wyoming. In southeastern British Columbia the Kishenehn formation, now dated as latest Eocene, indicates by its structural relationships that major movement occurred here in both Late Eocene and Early Oligocene time. In at least five other areas the evidence is compatible with a very late Eocene or very early Oligocene dating for the orogeny.

3. The Changing Worlds of Geology and Geophysics. By J. T. Wilson, F.R.S.C.

The past year in Canada has seen the publication of maps of gravity anomalies of six provinces, an estimate of thickness of the Canadian Shield, and a correlation of earthquakes and faults in southwestern British Columbia. Large areas have been mapped by airborne magnetometer. Estimates have been made of heat flow in British Columbia and of internal temperatures within the earth. Two hundred age determinations have been made. A physical explanation of the difference between Appalachian and Cordilleran structure has been advanced. Great scope exists for correlating such geophysical data with known geology.

4. Temperature and Heat Flow within the Earth. By J. A. Jacobs and D. W. Allan. Presented by J. T. Wilson, F.R.S.C.

A new study of the thermal history of the Earth from the standpoint of conduction theory has been made, using the Ferranti electronic computer at the University of Toronto. The solution takes account of the change with time of radioactive heat production. Tables have been prepared for the calculation of the temperature and heat flow at six depths in the Earth at six times in the past for various assumed distributions of radioactivity within the Earth. The results found have an important bearing on whether tectonic processes can be explained solely on the basis of thermal contraction of the Earth.

Section IV

5. Potassium-Argon Method for Determining the Ages of Minerals. By H. A. Shillibeer, E. A. Jones, and J. F. Sturm. Presented by J. T. Wilson, F.R.S.C.

Radioactive potassium 40 decays by beta emission to calcium 40 and by K-electron capture to argon 40. The rate of beta decay is now well established and the rate of K-capture is known within broad limits. Old potassium minerals have been analysed for potassium and radiogenic argon and the ages so obtained have been compared with ages determined by other methods.

Experiments on a sample crushed to different sizes have shown that fine crushing causes no loss of argon. The ages obtained for the different samples indicate that loss of argon during geologic time is unlikely and that provisional ages can now be determined for potassium minerals.

6. Age Determinations for some African Minerals. By R. M. Farquhar, P. E. F. Gretener, and J. T. Wilson, F.R.S.C.

The isotopic composition of lead contained in 53 specimens of galena and U-Th bearing minerals from Africa has been measured. The age of the Rhodesia-Tanganyika shield is now well established. Several determinations by Holmes and ourselves all lie between 2,100 and 2,600 million years. Other ages of over 2,000 million years have been found in Transvaal, Uganda, Kenya, northern Belgian Congo, and Sierra Leone. Specimens from Bondo, northern Congo (2.790×10^9 yrs.) and Rosetta Mine, Barberton, Transvaal (2.860×10^9 yrs.) are the oldest minerals yet found by the common lead method.

Tuesday, June 1

9.00 A.M.—Meeting of the Section.

7. Isotopic Analyses of Anomalous Lead Ores. By R. M. Farquhar and G. L. Cumming. Presented by J. T. Wilson, F.R.S.C.

The relative abundances of the isotopes of lead in twelve galena samples from the Tri-state district have been determined mass spectrometrically. A similar investigation has been made of samples from the major mining camps of Ontario and Quebec.

For the Tri-state specimens, the observed values of the lead ratios are considerably higher than those expected for lead of post-Mississippian age, and the variations in these values suggest a mode of formation of the ores involving the addition of large quantities of radiogenic lead.

Smaller variations have been observed in the lead isotope ratios of some Ontario and Quebec galenas.

8. Isotopic Analyses of Some Canadian Lead Minerals. By G. L. Cumming and R. M. Farquhar. Presented by J. T. Wilson, F.R.S.C.

Mass spectrometric analyses of galenas from four localities in Canada indicate that lead ores in any one locality may have considerable variation in their isotopic constitution. The variations occurring in the Yellowknife gold-quartz veins and in the British Columbia lead-zinc deposits are interpreted as indicating different ages of mineralization as has often been suggested on geological grounds.

Variations in the isotopic abundances of leads from the Anacon and Kingdon lead mines and an occurrence in the Lockport formation are considered to be due to the lead ores in different parts of the same deposit having had slightly different histories.

9. The Porphyries of the Porcupine Area, Ontario. By E. S. Moore, F.R.S.C.

The porphyries of this area have been of great interest to geologists because of their genetic relations to the gold deposits and the different opinions expressed by several writers regarding their ages, nature and origin. The presence of pyroclastics consisting mainly of fragments of porphyry almost identical to those in the intrusions has led to much confusion. The area is remarkable in the highly sodic, as contrasted to potassic, character of the acid rocks: i.e., the porphyries, albitites and granites.

An attempt is made in this paper to show the relations between pyroclastics consisting mainly of porphyry fragments and intrusive porphyries and to elucidate some of the features involving age relations discussed by the writer in a previous paper, "The Structural History of the Porcupine Gold Area."

10. Preliminary Studies of the Biochemistry of Nickel. By Harry V. Warren, F.R.S.C. and Robert E. Delavault.

Preliminary studies on the biogeochemistry of nickel have been satisfactory. Not only do many trees and lesser plants report anomalous amounts of nickel where they are growing over nickel mineralization, but also the nickel seems to be more evenly distributed in variously aged organs than do some other elements such as zinc, copper, and molybdenum.

11. Origin of Wabana Iron Deposits. By T. L. Tanton, F.R.S.C.

The iron ores at Wabana, Bell Island, Newfoundland, are interpreted as replacement deposits precipitated from iron-rich magmatic solutions that were injected into, and permeated, the fossiliferous, sedimentary host rocks of Ordovician age.

12. Directional Permeability. By Adrian E. Scheidegger. Presented by J. T. Wilson, F.R.S.C.

Investigations have shown that in groundwater and in oil-bearing strata there are preferential directions of flow that are often maintained over wide areas. Johnson and Hughes (Producers Monthly 13, No. 1, 1948, pp. 17-23) analyzed a series of oil well cores by cutting them into small horizontal plugs and they obtained directional permeabilities which they plotted in the form of polar graphs. They were not able to give a physical explanation of this phenomenon. On the other hand there exists a theory of permeability in which the latter is represented as a symmetric tensor. This theory has been developed by Ferrandon (*Génie civil* 125, 1948, pp. 24-28), but no experimental substantiation of it has ever been attempted.

In the present paper, the writer undertakes to compare the two sets of findings. From Ferrandon's theory, the directional permeabilities (denoted by k) corresponding to the experiments of Johnson and Hughes are calculated and it is shown that $k^{-1/2}$, if plotted as polar graph, should form an ellipse. The data of Johnson and Hughes are then recalculated and corresponding polar graphs of $k^{-1/2}$ are drawn. In this manner, a substantiation of the tensor theory of Ferrandon is obtained.

SECTION V. BIOLOGICAL SCIENCES

Monday, May 31

11.00 A.M.—Business Meeting of Section (Room 207, Science Building).

2.00 P.M.—Meeting of Section (Room 207, Science Building). Papers 1–5.

1. Presidential Address: Comparative Chemistry and Phylogeny of Flowering Plants. By R. Darnley Gibbs, F.R.S.C.

A review with contributions of the use of criteria other than traditional morphology in the classification of higher plants. Particular reference is made to the value of comparative chemistry in this field.

2. Flavelle Medallist's Address. Some Aspects of Protein Chemistry. By D. A. Scott, F.R.S.C.

3. Intellect and Human Survival. By Wm. Rowan, F.R.S.C.

Thanks to mass means of news dissemination, the twentieth century has become an era of propaganda, the antithesis of intellect, man's evolutionary specialty. What flying is to a bird, or swimming to a fish—their sole roads to survival—so is intellect to man.

Now that mass extermination is possible and can, with the stockpile of atomic and hydrogen bombs already in existence, be put into instant effect on a political whim, the current retreat from intellect may involve the obliteration of our present civilization and conceivably of mankind.

The situation is of such immediate urgency that, following a critical analysis, a possible approach to a solution will be proposed for discussion.

4. Therapeutic Approach to Arteriosclerosis. By Rudolf Altschul. Presented by L. B. Jaques, F.R.S.C. (15 min.)

It is generally assumed that arteriosclerosis is linked to cholesterol metabolism. Although cholesterol may play only a secondary role in a process which is primarily due to a weakness of the vessel wall, it may be of considerable practical value to keep the serum cholesterol at a low level and thus protect already vulnerable blood vessels. It appears that ultraviolet irradiation inhibits cholesterol arteriosclerosis in rabbits, and lowers the serum cholesterol in humans with arteriosclerosis. Similar results are being achieved with inhalation of oxygen. The effects may be due to oxidation (ozonide formation) of cholesterol.

5. Vicariism and Polyploidy. By Askeff Löve. Presented by W. Leach, F.R.S.C.

Vicariism is the phenomenon of corresponding taxa in ecologically or chorologically different regions. It is closely connected to some of the crucial points of dynamic geobotany, and holds a prominent position in studies on speciation processes.

Combined cytogenetical and taxonomical studies have been made on almost 300 species or races listed as vicarious in Europe and North America by specialists. It could be demonstrated that while all false vicariads have been produced by polyploidy, the true vicariads are gradual-species at different stages of evolution. The former include about 30 per cent of the vicariads.

Tuesday, June 1

9.00 A.M.—Meeting of Section (Room 207, Science Building). Symposium on the Biochemical and Biophysical Approach to the Solution of Biological Problems. Papers 6–9.

6. Some Contributions of the Protein Chemist to Fundamental Biological Phenomena. By E. Gordon Young, F.R.S.C. (30 min.)

Modern techniques for the separation and characterization of individual proteins will be discussed. Their application to such problems as the composition of blood, muscle, and skin, and of leaf proteins will be reviewed. Recent developments in the separation of humoral proteins will be presented. Localization of proteins in the nucleus will be discussed. The role of proteins in nutrition will be developed in relation to the composition of milk and eggs.

7. The Contribution of Biophysics. By Alan C. Burton, F.R.S.C.

His training in biophysics and mathematics should make a biophysicist an expert on instruments and on measurement of all kinds, and in the logic of precise interpretation of these measurements, including statistical evaluation. The usefulness of biophysics, however, is much more than this. A biophysicist, when he observes biological behaviour, is interested in the physical constitution of cells and organisms and the physical laws that underlie their behaviour. His field of interest and competence lies in the basic mechanisms rather than in the complicated result. Hence, he is less liable to be discouraged by the complexity and specificity of living things, and "to catch the resemblance of things." A biophysicist's use of "models" in biology is often misunderstood. It is not that he ignores the complexity of the real biological problem, but that he knows how unexpectedly complicated may be the behaviour of simple models. He therefore strives to understand first the model, in order to see what additional factors may exist in the real system. Examples of the use of biophysical models in biology will be given to illustrate this.

8. The Biochemical Approach to the Study of Photosynthesis. By G. Krotkov, F.R.S.C.

Photosynthesis has been often defined as synthesis of organic compounds from carbon dioxide and water in the presence of light. Biochemical studies with isotopes have revealed the first compound into which carbon is incorporated and the course of its subsequent transformation into sugars. Light apparently does not affect this course, and its role in photosynthesis is to produce the reducing power necessary for the reduction of carbon. It has been suggested, therefore, that synthesis of organic compounds from carbon dioxide and water by plants might be more appropriately called phytosynthesis than photosynthesis.

9. The Impact of Mathematics upon Zoology. By R. A. Wardle, F.R.S.C.

Tuesday, June 1

2.00 P.M.—Meetings of Section (Room 207, Science Building). Papers 10–21.

10. Microheterogeneity of Proteins. By J. R. Colvin, David B. Smith, and W. H. Cook. Presented by W. H. Cook, F.R.S.C. (15 min.)

Contrary to a body of earlier opinion, the pioneer work of the Svedberg School showed that purified preparations of the globular proteins were remarkably homogeneous in size, shape,

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and charge density. This finding, in conjunction with the specificity of enzyme and immunological reactions, and in spite of the known complexity of proteins, has given rise to the concept that a purified protein is a collection of identical molecules. A review of recent evidence shows that the best protein preparations made so far are microheterogeneous and represent populations of closely related, but not identical, molecules.

11. The Combined Amino Acids in Several Species of Marine Algae.
By Donald G. Smith and E. Gordon Young, F.R.S.C. (15 min.)

The distribution of the combined amino acids in the protein and peptides of five species of marine algae has been determined by quantitative chromatography. The composition of amino acids in the brown alga, *Ascophyllum nodosum*, was very similar to that of *Fucus vesiculosus*. The red alga, *Rhodomenia palmata*, and the green alga, *Ulva lactuca*, were also similar to each other but differed markedly from the distribution found in the brown algae. *Chondrus crispus* was distinctive for its high content of arginine and for the presence of ornithine and citrulline in the acid hydrolysate of the dried plant.

12. The Mechanism of Spore Wall Sculpturing in the Rust and Smut Fungi.
By D. B. O. Savile. Presented by J. W. Groves, F.R.S.C.

Spore wall patterns are occasionally produced by shrinkage or compression; but the principal method is for cytoplasmic activity to impress the pattern into the primary wall, in which it is fixed by formation of the thickened secondary wall. Instability in the peripheral cytoplasm causes flow in cylindrical cells with axes normal to the surface, producing separate warts or spines or reticulate ridges. The superimposition of longitudinal streaming partly or fully changes the symmetrical pattern to a striate one. The mechanism is analogous to that seen in altocumulus and cirrocumulus clouds.

13. Studies on the Physiology of Obligate Parasitism in Plants. By Michael Shaw and D. J. Samborski. Presented by G. A. Ledingham, F.R.S.C. (15 min.)

Infection with rust and mildew fungi caused marked increases in the respiration of susceptible hosts. The feeding of ^{14}C -labelled CO_2 and sugars to infected leaves revealed a rapid translocation of metabolites towards the infections. The effect of respiratory inhibitors on these processes has been examined and the importance of the latter for the successful establishment of an obligate parasite is discussed.

14. Bacterial Growth Factors in Soil with Special Reference to the "Terregens Factor." By A. G. Lochhead, F.R.S.C.

Many indigenous soil bacteria require for growth accessory substances present in extracts of soil. An important proportion of these organisms consists of forms dependent upon vitamin B_{12} . However, more fastidious bacteria require other factors, of which one, referred to as the "terregens factor," has been recognized as essential for *Arthrobacter terregens*. The factor, which is synthesized by other soil organisms, may be obtained from culture filtrates of *Arthrobacter pascens*, and in concentrated form shows growth-promoting activity at $1 \text{ m}\mu\text{gm/ml}$. Certain other characteristics of the factor are discussed.

15. Studies on the *Septoria avenae* Complex. By Dorothy E. Shaw. Presented by T. Johnson, F.R.S.C. (10 min.)

Leptosphaeria avenaria Weber f. sp. *triticea* T. Johnson is recorded for the first time in Australia and New Zealand. Pycnidia and perithecia were found on standing crops and stubble. The organism overwinters as perithecia, since viable ascospores were obtained from two-year-old stubble. Inoculation tests showed that infection was only obtained on wheat, the other cereals and certain grasses being immune.

Septoria avenae Frank f. sp. *anthoxanthi* f. sp. nov. is recorded on *Anthoxanthum odoratum* in Australia. Infection was only obtained on *A. odoratum*, the cereals and certain grasses being immune.

The occurrence of the *Septoria avenae* complex on cereals and grasses is discussed.

16. Winter Killing of Alfalfa by HCN Produced by a Fungus. By J. B. Lebeau. Presented by F. L. Drayton, F.R.S.C.

The low-temperature basidiomycete responsible for extensive winter killing of forage crops in Western Canada has been found to produce lethal amounts of HCN. The rate of HCN synthesis by the fungus appears to be directly correlated with mycelial growth. The crown buds of alfalfa plants, inoculated in field plots in mid-September, contained high concentrations of HCN in January and the plants died.

17. Haptotropic Responses by the Germ Tubes of Wheat Stem Rust. By P. K. Isaac. Presented by W. Leach, F.R.S.C.

Phenomena observed during the germination of uredospores and growth of germ tubes of wheat stem rust upon wheat leaves appear to be related to the composition and structure of the wheat cuticle. Investigation of the surface properties of isolated cuticle and of certain artificial surfaces has enabled some physical conditions governing haptotropic responses by this fungus to be ascertained. The bearing of this upon the problem of the formation of haustoria by fungi will be discussed.

18. The Nature of the Inhibiting Substance which is Emitted by Germinating Uredospores of *P. graminis* var. *tritici*. By F. R. Forsyth. Presented by T. Johnson, F.R.S.C. (10 min.)

The self inhibition of germination and respiration of *Puccinia graminis* var. *tritici* uredospores has been consistently demonstrated in Warburg flasks. Three means of removing the inhibitory substance have been discovered. A similar inhibition and recovery can be shown for cyclohexene but the absorption spectra of the inhibitor and of cyclohexene in acetone solutions reveal that cyclohexene is not the natural inhibitor.

Cyclohexene has an inhibitory effect on both growth and respiration of uredospore germ tubes at high concentrations, has a stimulatory effect on both, and also a formative effect in low concentrations and has no effect at still lower concentrations.

19. Chemical Treatment of Sclerotia of the Ergot Fungus in Relation to Their Behaviour in the Soil. By A. W. Henry. Presented by A. G. McCalla, F.R.S.C.

Sclerotia of the ergot fungus, *Claviceps purpurea* (Fr.) Tul., infesting cereal seeds, are difficult to kill by any treatment which will leave the seeds unharmed. Following a new approach, a treatment was sought which would prevent the sclerotia from functioning normally when

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deposited in the soil. A chemical treatment with mercuric chloride had this effect and caused no apparent injury to rye seed. Immersion for 5 to 10 minutes in a .1 per cent aqueous solution of this chemical may not kill the sclerotia but it directly or indirectly prevented a high percentage of them from forming stromata in natural black soil.

20. Improvement in Frost Resistance of Sugar Beet Seedlings Treated with Dalapon (2,2 Dichloropropionic Acid). By W. G. Corns. Presented by A. G. McCalla, F.R.S.C.

An earlier communication by the writer (Science 118, September 4, 1935) reported improvement in frost resistance of parsnip tops sprayed with chemicals in the field. The present paper summarizes a laboratory study with etiolated sugar beet seedlings (Kuhn) grown for six days at 22° C. in Petri dishes in vermiculite moistened with water or with chemical solutions. Sugar beets grown in 4 and 8 p.p.m. Dalapon solution were highly significantly superior to control plants in resistance to exposure to controlled freezing conditions. The chemical treatment produced no statistically significant effects on total emergence, root, or shoot length of seedlings.

21. Chromosome Breakage by Ionizing Radiations. By T. J. Arnason Presented by W. P. Thompson, F.R.S.C. (10 min.)

Equal doses (374 roentgens) of ionizing radiation of different energies were administered to different lots of *Tradescantia paludosa* buds. The radiations used were 200 KeV X-rays, 1.25 MeV rays from the Co⁶⁰ bomb and 23 MeV rays from the betatron. Chromosomes of dividing microspore nuclei were scored for breaks and reunions. The radiations of lowest energy were most efficient in causing breaks; the rays of highest energy were least efficient. Relative break frequencies were as follows: 1 : 0.82 : 0.74 for 200 KeV, Co⁶⁰, and betatron rays respectively. Reunion frequency paralleled break frequency closely.

Wednesday, June 2

9.00 A.M.—Meeting of Sub-section BOTANY and ZOOLOGY (Room 207, Science Building). Papers 22-32.

22. The Embryology of the Black Widow Spider. By J. G. Rempel. Presented by D. S. Rawson, F.R.S.C. (25 min.)

The Black Widow spider, *Latrodectus mactans*, has been the subject of extensive published accounts, but these deal mainly with its importance as a health hazard to man. The writer has made an intensive study of the embryology of this species from the time the egg is fertilized until the spiderling escapes from its chorionic envelope. A special effort has been made to correlate the internal changes with changes in the outward form of the developing embryo.

23. Persistence of the Right Sixth Arterial Arch in Mammalian Embryos. By R. F. Shaner, F.R.S.C.

The right arterial arch of mammalian embryos usually atrophies quite early, but may persist and even serve as the origin of the right subclavian and common carotid arteries. The author presents several examples from abnormal pig embryos. The unusual vessel arrangement is probably caused by fetal coarctation of the right aorta. Fetal coarctation of either dorsal aorta may be induced by traces of a fifth arterial arch.

24. A Revision of the Genus *Forcipomyia* (Diptera, Heleidae) Based Primarily on Characters of the Early Stages. By L. G. Saunders. Presented by D. S. Rawson, F.R.S.C. (15 min.)

Systematists have been perplexed by the close similarity of the adults of this very large genus, and have experienced difficulty in finding satisfactory characters to distinguish groups. Several of the more obvious groups have been split off and elevated to generic rank, but other groups remain in the unresolved mass of species in the region of high tarsal ratios.

The difficulty disappears completely when larvae and pupae are examined. Here are unmistakable specific characters, and the species fall naturally into distinct groups. On this basis seven subgenera have been established, with correlating characters in the adults.

25. The Net Plankton of Great Slave Lake. By D. S. Rawson, F.R.S.C. (15 min.)

Nearly 500 samples, taken during several years, show an average standing crop of net plankton in the main lake of about 20 kg. dry weight per ha. In the deep, cold, east arm the amount is half this. These are the quantities to be expected in large deep lakes of this area. Early- and late-summer maxima occur, with considerable seasonal irregularity but there is little annual variation in the average crop. Sixty to seventy per cent of the plankton is usually found in the upper 50 metres but a thin copepod plankton extends to the greatest depths (600 m.). Copepods, especially *Diaptomus*, *Limnocalanus*, and *Cyclops*, dominate the zooplankton while the diatoms, *Melosira*, *Asterionella* and *Tabellaria* dominate the phytoplankton. Green and blue-green algae are scarce. The quantity and quality of this plankton are characteristic of extreme oligotrophy.

26. The Genus *Potentilla* at High Latitudes and Altitudes. By Pierre Dansereau, F.R.S.C.

The cinquefoils (*Potentilla* L.) are widespread in the boreal hemisphere, and cross the Equator at high altitudes. Most species are temperate and there is reason to think of cool-moist areas as centres of development and geographical optimum.

Ecologically, rather few are found in shady or wet habitats.

Genetically they function on 2-ploid and also on 4-, 5-, 6-, 7-, 8-, 9-, 10-, 12-, 13-, 14-, and 16-ploid levels. There are no known 3-ploids and not many aneuploids. 4- and 6-ploids are the most frequent. They are very commonly apomictic, and many hybridize frequently.

The present study approaches the species of related and unrelated sections on a geographic-ecological plane and investigates their adjustment to an environment dominated by low temperatures. The species considered for study are only those that penetrate beyond the timberline (latitudinal or altitudinal). Some of these are confined to the arctic or alpine regions, others overlap very widely into subarctic, subalpine or even milder zones.

In the present study it is hoped to compare morphological variability, genetic lability, and morphogenetic patterns with floristic affinity, ecological amplitude, and apparent evolutionary opportunity.

27. Taxonomic Studies on the Genus *Rosa* in the Pacific Northwest. By T. M. C. Taylor and W. H. Lewis. Presented by A. H. Hutchinson. F.R.S.C. (10 min.)

Lack of agreement among taxonomists as to the most significant morphological criteria for distinguishing species prompted a statistical evaluation based on large samples. Data from twelve quantitative and a like number of qualitative criteria were studied. Certain of these were found to be statistically significant. Through their use the presence of four species, one interspecific hybrid, and several minor taxa was established. Interesting climatic correlations were also noted.

28. Facteurs limitant l'agressivité et la distribution géographique de l'Epervière orangée, *Hieracium aurantiacum* L. Par Richard Cayouette et Georges Gauthier. Présenté par Georges Maheux, M.S.R.C.

Des analyses de végétation et des reconnaissances répétées démontrent que *Hieracium aurantiacum* L. n'existe à l'état de fléau qu'au sud de 48° 30' de latitude nord. Au delà de cette limite elle cesse d'être agressive. Nos études sur le mode de croissance, sur les exigences en fait de température et de photopériodisme nous portent à conclure que ces deux facteurs limitent la nocuité et la distribution géographique de l'Epervière orangée.

29. A Natural Hybrid in European *Vaccinium*. By J. C. Ritchie. Presented by W. Leach, F.R.S.C.

The distribution of \times *Vaccinium intermedium* Ruthe (= *V. myrtillus* L. \times *V. vitis-idaea* L.) was described, and some account of the isolating factors between the parent species was given. It was concluded that an interaction of ecological, phenological, and reproductive isolating mechanisms is responsible for the limited, discontinuous distribution of the hybrid.

An analysis of wild populations and artificial progeny indicates that, with one known exception, only first generation plants are found, and the causes of this apparently slow rate of hybridization and introgression were suggested.

30. Chromosome Studies of Rust Fungi. By R. C. McGinnis. Presented by T. Johnson, F.R.S.C. (10 min.)

Chromosome counts made on germinating sporidia of *Puccinia graminis* and *Puccinia coronata* revealed haploid numbers of 6 and 3, respectively. The possibility that polyploidy exists in the genus *Puccinia* is indicated, the basic chromosome number being three. Preliminary work on two other species of *Puccinia* seems to support this hypothesis.

In studies on *Melampsora lini*, there appeared to be 4 haploid chromosomes. Several workers have reported $n = 4$ and $n = 8$ for species in several genera of the Uredinales. Therefore there may possibly be two distinct polyploid series in the rusts, one with a basic chromosome number of 3, and the other with 2 or 4.

31. Les oxydases terminaux des racines de *Picea mariana* (Mill.) B.S.P. et de *Pinus Banksiana* Lamb. Par André Lafond. Présenté par Georges Maheux, M.S.R.C.

L'étude des oxydases terminaux des principales essences forestières du Québec a été entreprise dans le but de déterminer comment les propriétés des sols peuvent affecter le comportement des arbres croissant en peuplement. De l'ensemble des expériences poursuivies par l'auteur, il semble résulter que l'acide ascorbique est le seul oxydase présent dans les racines des deux espèces étudiées et qu'il réagit d'une façon optimum à une valeur de pH voisine de celle des sols où se rencontrent normalement l'épinette noire et le pin gris.

32. Le rôle déterminant des mycorrhizes dans la nutrition en éléments minéraux de *Betula papyrifera* Marsh. Par Roger Gosselin. Présenté par Georges Maheux, M.S.R.C.

Les bouleaux à papier croissant dans un tchernozem démontrent une carence nutritive qui se traduit sur les feuilles par une chlorose terminale suivie d'une nécrose. Après inoculation du sol avec *Amanita muscaria*, les symptômes de déficience alimentaire ne se manifestent plus ou disparaissent. L'analyse de la teneur des feuilles en éléments minéraux confirme l'effet de la mycorrhization sur l'assimilation des éléments minéraux.

Wednesday, June 2

9.00 A.M.—Meeting of Sub-section PHYSIOLOGY and MEDICINE
(Room 212, Engineering Building). Papers 33–43.

33. Metabolism of Radioactive Glucose and Glutamine in Wheat Leaves.
By R. G. S. Bidwell, G. Krotkov, F.R.S.C., and G. B. Reed, F.R.S.C.

Wheat leaves were placed first on 0.1 M solutions of C¹⁴ uniformly labelled glutamine or glucose for one hour, and then on water either in light or darkness. At the end of nine hours the activities in various leaf fractions were determined.

It was found that glutamine taken in was metabolized about twice slower than glucose. While glutamine yielded sugars only in light, glucose was converted into glutamine and glutamic acids both in light and in darkness. Formation of alcohol insoluble proteins from glucose was practically unaffected by light, while from glutamine it proceeded in light twice faster than in darkness.

34. The Development of Root Hairs in Radioactive Calcium Solutions.
By R. G. H. Cormack and Clayton Person. Presented by E. H. Strickland, F.R.S.C.

Earlier investigations have shown that calcium is essential for the development and growth of root hairs. In the present study microautoradiographs were made of root hairs of cabbage seedlings formed in radioactive calcium solutions in an effort to substantiate earlier evidence that calcium is a component of the root-hair wall.

35. An Effect of Estrogens on Water Intake. By J. S. Thompson. Presented by R. F. Shaner, F.R.S.C.

Male mice of A strain (Strong) and C57BL strain (Little) show a dilatation of the urinary bladder when subjected to prolonged estrogen stimulation (Shimkin *et al.*, 1942; Horning, 1949). It has now been shown that there is a concomitant increase in water intake in these two strains. C3H strain (Strong) male mice do not show these effects. The dilatation of the bladder is partly dependent on the increased water intake since it is delayed and reduced when the mice are placed on reduced water intake.

36. Blood Levels of Lactic Acid and Glucose in Some Freshwater Fishes following Exercise. By Edgar C. Black. Presented by A. H. Hutchinson, F.R.S.C.

Five species of freshwater fishes were exercised forcibly for 15 minutes in water at 11° C. Samples of blood were taken by cardiac puncture immediately afterwards while the fish continued to respire in water. Unexercised fish served as controls. The mean lactic acid values for the unexercised state ranged from 8–9 mg. per cent for the chub, carp, and northern black catfish, to 17–19 mg. per cent for the Kamloops trout and fine-scaled sucker. Following forced exercise the mean values for lactic acid increased significantly in all species with a gradation which corresponded to the apparent activity of the species in question: i.e., northern black catfish, 33 mg. per cent; carp and fine-scaled sucker, 54 mg. per cent; chub, 82 mg. per cent; and Kamloops trout, 100 mg. per cent. The glucose increased significantly following exercise in the chub and carp. Changes in glucose were observed in the remaining species, but they were not significant. (This project was supported by a grant from the National Research Council, Canada.)

37. Influence de la substitution du dextrose à la glycérine dans le milieu de sautou sur la croissance et la composition de *Mycobacterium tuberculosis* var. BCG. Par Maurice Panisset et Vincent Portelance. Présenté par Armand Frappier, M.S.R.C.

Les auteurs ont étudié l'influence de la substitution du dextrose à la glycérine comme source de carbone dans la culture de *M. tuberculosis* var. BCG.

Ils observent que cette substitution augmente la récolte de bacille de 200 per cent si l'on remplace 5 per cent du taux normal de glycérine par un poids équivalent en carbone de dextrose. Cet effet n'est pas observé si la substitution s'élève à 25 per cent. La substitution de 5 per cent diminue la teneur des bacilles en phosphatides et modifie l'aspect physique des graines solubles dans l'acétone.

38. Propriétés antimycobactériennes des sérums de tuberculeux: Résultats préliminaires. Par Maurice Panisset, Georges Préfontaine, et Maria Dobija. Présenté par Armand Frappier, M.S.R.C.

Une épreuve de neutralisation appliqué dans des conditions bien déterminées à *Mycobacterium tuberculosis* var. *bovis* (Ravenel) montre que certains sérums de tuberculeux ou d'animaux expérimentalement infectés montrent un pouvoir antimycobactérien élevé, alors que d'autres dont l'état d'infection est comparable donnent un sérum moins actif ou inactif. Ces variations sont recherchées en utilisant comme critère de l'inactivation l'infection de la souris par inoculation intracérébrale, ou l'infection du cobaye par la méthode intradermique de Lester.

39. Dispersion of Labelled BCG in Guinea Pig. II. Comparison between living and heat-killed BCG. By J. Sternberg, M. O. Podoski, and A. Frappier, F.R.S.C.

BCG labelled with P^{32} releases a fraction of the integrated isotope (maximum 2-3 per cent) when resuspended in distilled water or in phosphate buffer. This fraction is much more important when the microbial suspension is heated at 60°C, reaching values as high as 25-30 per cent of the total integrated P^{32} , even if the heating lasts as little as 15 minutes. The released P^{32} is probably labile phosphate, whose metabolic fate is distinct from that of stable phosphorus integrated in microbes; the pathway of the latter indicates the microbial dispersion.

Experiments were carried out with living and heat-killed microbes injected in guinea-pigs, in order to trace the pathway of the stable as well as the labile phosphorylated microbial constituents.

40. The Determination of Glutathione Reductase Activity in Mammalian Erythrocytes. By H. Bruce Collier and Sheila C. McRae. Presented by N. H. Grace, F.R.S.C.

The observation of Francœur and Denstedt (Proc. Canad. Physiol. Soc., 1952, p. 25), that human and rabbit erythrocytes contain an active glutathione reductase, has been confirmed. The reduction of oxidized glutathione was measured in the presence of glucose-6-phosphate, triphosphopyridine nucleotide (TPN), and Mg^{++} . The quantitative nitroprusside reaction was found satisfactory for the demonstration of reductase activity, but the amperometric titration of -SH groups with Ag^+ was finally adopted for use in the presence of inhibitors. Contrary to the finding of Francœur and Denstedt, no reductase activity was observed

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when TPN was replaced by DPN. The enzyme does not reside in the red-cell ghosts, as their removal did not decrease the activity. The enzyme was slightly inhibited by phenothiazine, phenothiazone, and *p*-chloromercuribenzoate, but not by phenylhydrazine. (With financial assistance from the Defence Research Board of Canada, grant no. 352 (Med).)

41. The Enzymatic Hydrolysis of β 1:4'-Oligoglucosides. By D. R. Whitaker. Presented by W. H. Cook, F.R.S.C. (30 min.)

The mechanism of enzymatic hydrolysis of linear chains containing from two to six β -linked glucose units will be discussed. The main problems considered will concern the effects of the number of linkages in a chain and of linkage position within a chain on the rate of enzymatic hydrolysis.

42. Recent Studies on the Nutrition of Mammalian Cells in Tissue Culture. By J. F. Morgan. Presented by James Gibbard, F.R.S.C.

A chemically defined medium for tissue cultures (Mixture 199) had been developed previously which would support cell life for prolonged periods but would not permit extensive proliferation. Employing this synthetic medium as a base, a survey has been made of the distribution in natural materials of growth-promoting activity for chick embryonic fibroblasts. The experimental results suggest that coenzymes may be responsible for this activity.

It has been demonstrated that L-cystine is essential for survival of tissues *in vitro* and that the cystine requirement cannot be satisfied by methionine, as in the intact animal. The ability of other sulphur-containing compounds to replace cystine has been studied.

The experimental observations will be interpreted in terms of a general pattern of cell nutrition and some possible applications of tissue culture to biochemical research will be discussed.

43. Free Sugars in Barley and Malt. By W. O. S. Meredith. Presented by J. A. Anderson, F.R.S.C.

The growth processes undergone by barley during malting develop enzyme systems that produce a high amount of free sugars on mashing of the malt. Relatively small amounts of free sugars are present in barley and malt that have been extracted under conditions that minimize enzymatic activity. The kinds and amounts of the free sugars in malt are indicators of the extent of the germination process. Changes in sugars from barley to malt were determined by means of chromatographic procedures.

Wednesday, June 2

2.00 P.M.—Meeting of Sub-section BOTANY and ZOOLOGY (Room 207, Science Building). Papers 44–46.

44. Palaeobotanical Method in the Prediction of the Northern Organic Terrain Sub-Surface Ice Conditions. By Norman W. Radforth. Presented by G. Krotkov, F.R.S.C.

The active layer of the permafrost which, for most of the summer season, is incorporated in the organic matrix of northern organic terrain, assumes different form characteristics depending upon variation in physical constitution of the matrix. Summer history of ice-pattern form and variation in ice contour shows relationship to type of vegetation cover. Mapping of physiographical features and prediction of ice conditions from the ground and the air are thus facilitated.

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45. Certain Forest Boundaries in Southern Labrador-Ungava. By F. Kenneth Hare and R. G. Taylor. Presented by R. Darnley Gibbs, F.R.S.C.

Within the Boreal Forest, great significance attaches to two boundaries: (i) the forest/ woodland boundary, marking the northern limit of predominantly close-crown forest, and (ii) the inland boundary of the coastal tundra, so conspicuous along sub-arctic coasts. Hitherto their position in Labrador-Ungava has been imperfectly known. A group at McGill University has completed the mapping of the forest physiognomy of southern districts, using Hustich's classification. The method of survey has been the interpretation of vertical aerial photographs, employing keys developed on the ground. Isopleth and distribution maps illustrate the boundaries, for which quantitative definitions are proposed.

46. Population Genetics: Population Aberrations Related to Parent Sex-Ratios and Barriers. By A. H. Hutchinson, F.R.S.C., and R. E. Tinney.

In cultures of *Drosophila* the production of offspring is not random, the genetic laws of Mendel are valid, as conditioned by certain pressures. Population increase is not proportional to the number of the male or female parents in least sex-ratio. Contra-gametic pressure in a definitely significant factor. Similarly the factors of area and barriers are evaluated as genetic modifiers. "Free inter-breeding" is theoretical and seldom, if ever, occurs under natural circumstances.

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- 2.00 P.M.—Meeting of Sub-section PHYSIOLOGY and MEDICINE.
(Room 212, Engineering Building). Papers 47-51.

47. Factors Influencing Toxin Production by *Clostridium botulinum* type E.
By C. E. Dolman, F.R.S.C., and Helen Chang.

The well-known fluctuations in the toxigenic capacity of *Clostridium botulinum* cultures seem especially marked with type E strains, which frequently become non-toxigenic. The composition of the nutrient medium, particularly with respect to protein and dextrose content, the pH, degree of anaerobiosis, and temperature of incubation, are important influences on toxin production; but the indispensable factor is a specific bacterial mutant.

Most type E strains yield two or three well-defined mutants. One of these, which sporulates freely, is non-proteolytic and non-toxigenic. Another displays very few spores and is markedly proteolytic, but is again non-toxigenic. A third mutant, which exhibits distinctive biochemical and colonial characteristics, is toxigenic, this capacity being enhanced when it is grown in association with the proteolytic variant. Analogous observations have been made on other types of *Clostridium botulinum*. There is some evidence that these mutational phenomena are related to the presence of bacteriophage in the cultures concerned.

48. Growth of *Pseudomonas aeruginosa* with Glucose, Gluconate, or 2-Ketogluconate as Carbon Source. By Jack J. R. Campbell, Audrey G. Linnes, and Blythe A. Eagles, F.R.S.C.

Growth experiments with limiting amounts of either glucose, gluconic acid, or 2-ketogluconic acid as the sole source of energy revealed that equimolar quantities of each of the three substrates produced equal amounts of growth of the test micro-organism, *Pseudo-*

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monas aeruginosa. The data indicate that no energy is gained by the organism through the oxidation of glucose to gluconic acid or by the oxidation of gluconic acid to 2-ketogluconic acid and support the conclusions previously reached that phosphorylation is not encountered at the hexose level in the metabolism of this micro-organism.

49. The Relaxation Time Spectrum of Dough and the Influence of Temperature, Rest, and Water Content. By J. R. Cunningham and I. Hlynka. Presented by J. A. Anderson, F.R.S.C.

The effect of temperature, rest period, and water content on stress relaxation in doughs held at constant extension has been studied. Temperature was varied from 13 to 35°C., rest period from 2 to 120 minutes and water content from 74.4 per cent to 86.0 per cent dry basis. Master relaxation curves on a log time plot were constructed for the temperature range. It was found that the long relaxation time end of the distribution of relaxation times was affected most by rest period, decreasing as rest period was increased, and the short time end increased as water content was decreased.

50. On the Vertical Movement of Minerals through Stratified Lake Waters
By F. R. Hayes, F.R.S.C. (15 min.)

The effect of a temperature gradient in producing a flow of salts through a column of water is described. The mechanism appears to be diffusion pressure, which varies with the absolute temperature. Thus in a thermally stratified system, a flow of salts into the colder water would be expected. The expected flow has been demonstrated in laboratory experiments and the expected salt distribution has been observed in lakes.

Various minerals including potassium, sodium, radiophosphorus, and radiocalcium have been observed to migrate vertically, and characteristic conductivity effects are also described.

51. Dosage potentiométrique de la lipase sérique. By Jules Labarre, M.S.R.C. et Vilma Jansons.

Le dosage de la lipase sérique peut s'effectuer commodément sur substrat à la triacétine aqueuse chlorurée sodique, après une incubation de 2 heures, à 37.5°C. L'acidité libérée est titrée au potentiomètre par la solution NaOH 0.05 N, en ramenant le mélange hydrolysé à son pH initial d'avant hydrolyse.

Les valeurs normales se situent entre 0.3 et 1.25; elles se distribuent selon le pH du mélange initial serum-substrat.

OCEANOGRAPHIC SESSION

(Arranged by Canadian Committee on Oceanography)

Wednesday, June 2

8.00 P.M.—Symposium on Hudson Bay.

1. The Climate of the Hudson Bay Region. By Andrew Thomson, F.R.S.C.

The climate of the Hudson Bay region is dominated by Arctic air masses moving towards the southeast from the Canadian Archipelago bringing lower annual temperatures than are found elsewhere in the Northern Hemisphere at the same latitude. Annual precipitation averaging fifteen inches, which occurs mainly as rainfall in the late summer, is of frontal character due to over-running tropical air masses. Much fog and low stratus cloud from June to September are caused by cold water due to floating ice in Hudson Bay.

2. The Pattern of Ice Distribution in Canadian Arctic Seas. By I. M. Dunbar. Presented by G. S. Field, F.R.S.C.

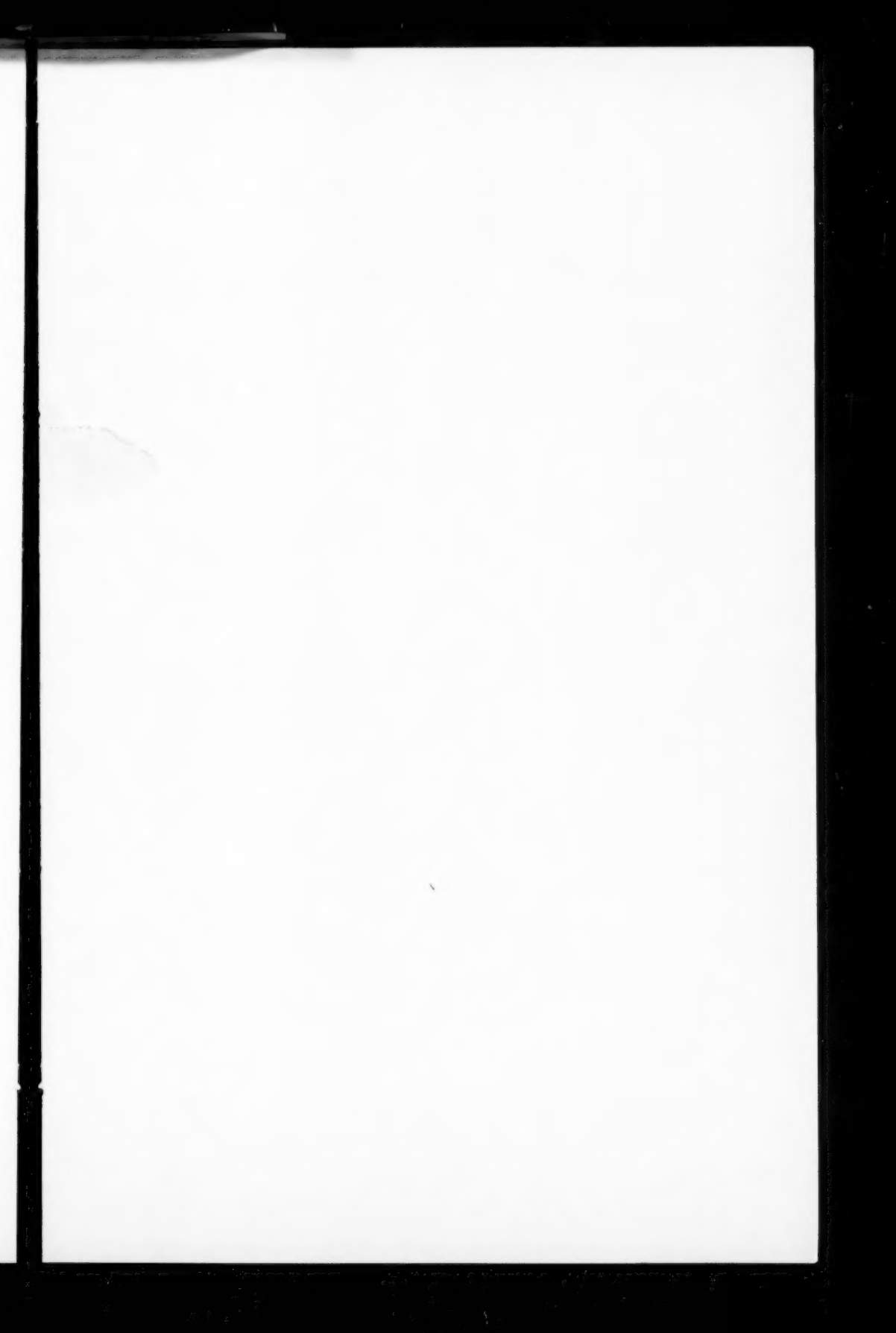
Until recent years only occasional observations of ice conditions in the Canadian Arctic were available. This led to many misconceptions, as for instance the idea that the centre of Hudson Bay never froze. With the development of flying operations in the far North, however, more frequent and more widespread observations have been made, and it is now possible to discern a certain pattern which persists in spite of variations from year to year.

3. Features of the Waters of the Eastern Arctic. By H. B. Hachey, F.R.S.C., and W. B. Bailey.

The waters of the eastern Arctic and the northwestern Atlantic are described, with particular reference to the influence of the southerly flow of these waters on more southerly latitudes.

4. Production of Life in Hudson Bay. By A. G. Huntsman, F.R.S.C.

The plants and animals of Hudson Bay are largely arctic and marine in accordance with movement of water thither from the Arctic Ocean at the north. Only a shallow surface layer warms in summer, mainly at the south where it is freshened from rivers and supports somewhat subarctic and estuarial forms. Without deep tidal mixing, renewal of the surface supply of nutrient salts for high plant production fails, giving negligible fisheries. Conditions for productivity improve along the course of the water up the coast to and through Hudson Strait and thence down the Labrador coast to the Newfoundland banks.



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